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Vitruvius Under a Cloud.

MOST architects are men of feeling; some are men of letters. Those who are both, and who hold in affection the literary monuments of their craft, and the links which join one generation of architects to another, will look with melancholy apprehension upon the utterances which Professor Ussing has recently put forward. His pamphlet* upon the "Ten Books of Vitruvius," to which he gives the innocuous title of "Observations," is no less than a determined and scholarly attempt to unseat our old favourite, not merely from his supremacy as a classic authority, but from the reputation of ordinary integrity.

Briefly, Professor Ussing's charges against Vitruvius are: First, that his task as an instructor is done, that the information which his work has for generations afforded is now superseded by the more direct and authentic evidences derivable from actual examples of ancient architecture; secondly, that instead of being (as we used to hope and think) a man of knowledge and integrity, he was a shallow-minded and ignorant person, boasting of knowledge which he did not possess; and finally, that he did not live in the Augustan Age, as his statements would lead us to suppose, but was a writer of later period, and possibly assumed not his knowledge only, but his very name.

To analyse Professor Ussing's attack in another way we may say that Vitruvius (or should we rather call him the "pseudo-Vitruvius"?) is accused of three moral and literary crimes. The first is that of being as unlearned as he is pretentious; the second is that of antedating his own existence by some three or four centuries; and the third is no less than the assumption of another man's name. Ignorance, hypocrisy, and fraud are the heads of the charges, and the evidence in detail may be gathered together into the following summary:—

First the author is judged out of his own mouth; his speech is said to betray him. His style, says Professor Ussing, is late, and his diction abounds in words which only came into use at a date considerably later than the period to which he boasts of belonging. Next our attention is turned to the contents of his work and to its omissions. The pseudo-Vitruvius is accused of addressing Augustus incorrectly, which a real Augustan Vitruvius would not have done; he is accused of certain "cock-and-bull" stories which are said to reveal his falsity; he is accused of omitting the mention of buildings which he should have mentioned, and of incorrectness as to those which he does include; and, strangely enough, it is brought forward (not without a show of reason) as an argument for his *lateness* that all the buildings he pretends to know anything about are not buildings of the Empire, but earlier buildings of the Republic. His canons of proportion and rules of the orders are, to continue the indictment, not those prevailing in the Augustan age; the authorities he quotes are not genuine; his account of the Greek Theatre is muddled and incorrect; his allusions to the worship of Isis betray his ignorance of the suppression of that worship by Augustus; and (cruellest blow of all!) whatever else he may know about, he does not know his own trade. Finally, his relation to other authors is brought into court, and it is asserted that he pillaged Athenæus (thereby not merely jeopardising his reputation for honesty, but actually disproving his assumed date), that he plundered from and distorted the utterances of Pliny the Elder, and that if we only had by us the text of Varro's "De Architecturâ," we should be able to bring home against him a third charge of unscrupulous literary robbery.

At first reading of the pamphlet we are bound to admit that we threw Vitruvius over and sided with the enemy. Professor Ussing is one of those few men who understand something of architecture as well as being an acknowledged authority on the classic languages. His weight is great, his arguments are searching, and they are appallingly numerous. We were not, to be sure, convinced under every head of the indictment, but it seemed to us that a refutation here and there of this particular argument or that would be worth so little in such an ocean of incrimination that hope had practically to be abandoned. We even put pen to paper for an epitaph on one "who had lived beloved for 400 years and died by the stroke of a Danish pen"; but with a second reading came a ray—just a ray of hope.

This journal is not a philological organ, and it will, therefore, not be expected that we should here stand up to Professor Ussing on his own ground, nor meet him with his own weapons. The considerations we shall put forward will, therefore, be rather unprofessional than technical—they represent the indications, from a layman's point of view, of the lines upon which it is hoped that some classical scholar may take up the cudgels and succeed in vindicating the honour of one who has so long been venerated. Our remarks, in fact, are to be taken as the sort of reflections that may naturally be put forward by the architect who, while he has his drawing-board before him, keeps at his elbow a few of his old school friends on a bookshelf.

Let us go through in brief the arguments which the critic has brought together, and offer, as far as seems possible, some indication of the lines on which our old friend may yet be saved by some skilled student from his present overshadowed position.

To begin with the last argument first; a case is made out against Vitruvius in his relations to Athenæus, the stages of which may be stated syllogistically thus. Athenæus, says Professor Ussing, wrote in the third century A.D. Vitruvius copied Athenæus; therefore Vitruvius belongs to the third or some subsequent century. Now we have followed with some care the parallel passages of Athenæus and Vitruvius which the writer of the pamphlet has brought together, and we are on the whole prepared to admit that the writer of what is known as the Tenth Book of Vitruvius copied either from Athenæus or from a common source, from which both parties must in that case have transcribed pretty closely. Possibly Vitruvius (if he was Vitruvius) copied Athenæus,* but this admission still leaves us a long way from any proof that Vitruvius must be relegated to the third or fourth century.

* Observations on "Vitruvii de Architecturâ: libri decem," by J. L. Ussing, Ph.D., &c. Translation printed by the Royal Institute of British Architects. 1898.

* This is no new idea. See Marini's note on Vitruvius x. 16 (19). Vossius and Perrault both held this view, but Marini himself discards it in favour of the notion that Vitruvius copied Agesistratus, whom Athenæus mentions as his source (de Machinis, p. 3), and whom Vitruvius himself names (Bk. vii. præfat as an authority.

In the first place it will be noticed that the passages which are parallel to Athenæus all occur in the last (tenth) book of Vitruvius and are all subsequent to the eighteenth chapter. We confess that it would by no means distress us to find that these last chapters were an interpolation, or rather an unauthentic termination to the genuine text. We have no knowledge of any evidence for such a suggestion; we merely put it forward as a possibility. But, granting the authenticity of the last chapters of the last book, and granting also that Vitruvius copied Athenæus, we believe it is by no means proved that Athenæus belongs to the third century A.D. Dr. Ussing bases his contention in this matter upon his diction, and upon his political sentiments, which, he says, are those of the later empire. But the fact that Athenæus dedicated his work to Marcellus, and the supposition that he was a friend of Archimedes, together with other indications which we need not detail here, have, among good authorities, been considered evidence that Athenæus lived—in the third century to be sure, but the third century B.C.!

Next (to continue working backwards through the arguments), Vitruvius is tried on his relation to Frontinus and Pliny. Now, it happens that both Frontinus and Pliny allude to Vitruvius by name. This circumstance, according to Professor Ussing, is a proof, not of his genuineness, but of his disingenuousness. He hints that the pseudo-Vitruvius, knowing of the mention of Vitruvius in Frontinus, and finding in Pliny an actual acknowledgment of indebtedness to him, craftily seized on the name as his *nom-de-plume*, and endeavoured to play up to the character of the dead authority whose works were lost. The obvious argument against such a theory is that a forger of the third century would probably have played the game a great deal better than Vitruvius can be proved to have done. He would certainly have taken pains to make triumphant use of the actual word *quinaria** as the name of the standard of measurement which Frontinus attributes to him. As a matter of fact Frontinus (Knobloch edn., p. 9) never says that he finds the term in the text of Vitruvius, but only that tradition in the trade commonly ascribed it to him, and he further implies that Vitruvius introduced or favoured the system of naming the bore of a pipe from the width of the sheet of metal from which it was formed, which is perfectly true (*vide* Vitruvius viii., 7).

Dr. Ussing produces a formidable array of passages in which the elder Pliny and Vitruvius run parallel, and his attempt is to prove that, instead of Pliny having epitomised Vitruvius (which has generally been assumed on the strength of Pliny's acknowledgement and of their supposed relative dates), the parts are really reversed. Vitruvius, in his opinion, has expanded and sometimes stultified the utterances of Pliny. We are far from satisfied on this point. If it comes to calling one or other of the writers an old fool, we would as soon give the title to Pliny. The latter, in his brevity, is quite as obscure as Vitruvius in his prolixity, and if we look to power of expression, and even to style, we do not think that Pliny need hold his head too high. We shall have another word to say under this topic later, but we must mention here that Professor Ussing himself provides a loophole from the Pliny indictment by the suggestion of Varro as a source for both authors.*

In many ways the most threatening part of Dr. Ussing's argument is that which he bases on the character of the language used by Vitruvius. The consideration of this we will postpone to examine first the charges based upon the contents of his work.

The earliest among these is the puzzle as to the impropriety of Vitruvius addressing the Emperor as "Imperator" after he had officially received the title "Augustus."† In the Third Book Vitruvius alludes to the temple of Quirinus, which was built in the year 16 B.C. It has, therefore, been generally argued that he wrote after that date and (for other reasons) before the year 13 B.C. Now Professor Ussing declares that a genuine Roman citizen living and writing between these dates could not possibly have been guilty of the impropriety of calling Augustus Imperator." There are ways of escape for Vitruvius even here. People did not correct proofs for the press in the days of Augustus, and it is just conceivable that the Preface might have been written before Augustus received the title, and that it was never corrected afterwards. Again, it is possible that Professor Ussing may be mistaken as to the incapacity of an ordinary professional man to make a slip of the pen (or of the memory) even in the irreproachable Augustan age. We have known architects who could make errors in the addressing of potentates in this virtuous Victorian era. Were they infallible in the year 13? Vitruvius, again, was an old man, and old men sometimes call things, and even men, by the names they knew them by in youth. Dr. Ussing makes great capital, and no little fun, out of two stories told by Vitruvius of Cæsar's campaigns. One is what we may call a philological story about an Alpine fortress said to be named Larignum, after the larch tree (*larix*). Vitruvius, in this instance, probably made a mistake, but it is a mistake that could have been made as easily in the first century as the fourth, and is really no evidence against his being alive in the time of Cæsar and Augustus. The next story which Professor Ussing looks upon as almost fatally conclusive is the account of certain mines and countermines which formed part of the strategic devices of the siege of Marseilles. He implies that these mines, which the besieged filled with water from the sea and other sources, are looked upon by Vitruvius as the turning point of the siege, and as the means of victory to the Massilians. Then he points triumphantly to Cæsar (Bellum Civile ii.), and shows that Cæsar has not a word to say about the mines, and that, as a matter of fact, the besiegers got the better of the operations. This criticism is, we think, unfair. Vitruvius never says that the temporary advantage gained by the countermining operations secured *final* victory for the Massilians; and as to Cæsar's silence on the subject, it is of little account. The siege lasted many months. Cæsar's account does not even profess to mention every detail of the blockade, and for that matter there is an allusion to certain operations which were abandoned by the Cæsarians before taking to the particular contrivance which brought the siege to a successful end. Moreover, Cæsar writes that the "musculus," which was eventually the means of success to the besiegers, was a device adopted by those on the right wing of the attacking army: the mining operations may easily have taken place in another part of the line of attack.*

It is worth mentioning that Gwilt's translation—a very free and easy translation, to be sure—goes so far as to dissociate a great part of the incriminating account from the special allusion to Marseilles, and treats the flooding episode and its successful issue not as a historical record of what happened at Marseilles, but as an account of general or possible procedure in such cases. If, as suggested above, the latter part of the Tenth Book were by any chance to be found spurious, this passage would go with it, being among the closing sentences.

That the buildings mentioned by Vitruvius are for the most part buildings of the Republic, may, of course, be evidence, as Professor Ussing pleads, that the writer lived at a late date and copied an early author; but the conclusion is at least a very indirect one, and it is fair to note that the same fact has been considered among previous commentators to be a proof of his early date. If Professor Ussing's assumption and conclusion were correct it would be almost inconceivable that a man in the third century, setting out to write an elaborate forgery, should not have included in his nefarious composition at least a few of the very well-known buildings that marked the Augustan epoch. It is infinitely more likely that Vitruvius in old age, and possibly in rural retirement, put together the notes, many of which he had made in his youth, and that they contain in their collected form such slips and omissions, such inaccuracies and such garrulities, as old age loved even in Augustan days.

We have disclaimed the attempt to overthrow Professor Ussing's contentions; the task lies outside the province of a technical journal of this kind, and it will not therefore be expected of us that we should follow the critic through every stage of his hostile argument. Before, however, we look at the last line of attack—the question of style and diction—we feel bound to offer a few further observations on some of the remaining criticisms directed against the contents of the text. The onslaught upon Vitruvius as being unlearned in his own trade is pointed by the suggestion that he does not know burnt bricks from unburnt, or forgot to mention the former. What then is the meaning of *coctus later* contrasted with *crudus* in Book I., ch. 5? The statement that the Doric column is given by Vitruvius as six diameters high, whereas the general Augustan

* We are of course aware that the word *quinaria* does occur in Vitruvius as meaning a pipe made of a sheet five digits wide, but it is not referred to by him as a standard of measurement—the standard being no doubt adopted after Vitruvius wrote the chapter on this matter.

* Varro, who lived from B.C. 116 to B.C. 28, was the most copious of writers. He issued between five hundred and six hundred works, of which only the *De Re Rusticâ* and the *De Linguâ Latinâ* have survived. It is known that one of his books dealt with architecture, and it is certainly within the range of possibility that both Pliny (who died A.D. 79) and Vitruvius may have made use of his writings as a storehouse of information. Such a view is strongly supported by Vitruvius's allusion to Varro in the preface of Bk. vii.

† This difficulty was known to the older commentators, and led to the suggestion that the Imperator addressed was Titus.

* The use of water as a means of defence by the Massilians is certainly not disregarded in Cæsar's account, for, speaking of the musculus, he says, "*Supra lateres coria inducuntur; ne canalibus aquâ immissâ lateres diluere possit.*" Bell. Civ. ii., 10

use was seven, does not, we confess, shake our faith. As a matter of fact, Vitruvius does not say that the proportion of 6 : 1 was in use in his day, but that it was *originally* in use. Again, we resent the suggestion that Vitruvius was incompetent because he gives 1 in 200 as the *minimum* gradient for an aqueduct, while Pliny gives a greater fall. Frontinus, our best authority, is very clear on the point that the ancient aqueducts differed from one another in the matter of gradient (Front. de Aqu., p. 7, edit. Knobloch.). That Vitruvius quotes false authorities is another of Professor Ussing's charges. We are not sure that he proves it, but if proved it does not satisfactorily settle the location of him in the third or fourth century. We admit at once that the lists of authors quoted are bombastic; they may or may not be inaccurate; in fact, we regret them as undesirable excresences; but they are no proof of fraud or of late date.

That the decree of Augustus forbidding the worship of Isis would render impossible an allusion to temples of Isis by a true Augustan, we simply deny. Vitruvius does not say or even imply that there is a temple of Isis in every city, he merely gives direction as to placing the temple of Isis and Serapis (if there be one) in the great public square. The interdict of Augustus applied to Rome and the surrounding district only; there would therefore be no great impropriety in merely mentioning Isis in connexion with the laying out of new cities, even in a work dedicated to Augustus.

The difficulty about C. Julius, son of Masinissa, who is said to have stayed with Vitruvius, has been got over by earlier commentators by the suggestion that he was born in the old age of Masinissa, among whose titles to fame are his large family and great age.

We are now brought face to face with the first argument of Professor Ussing, which we have elected to treat last. In this it is contended that Vitruvius is late in style and late in his use of certain words. Here, in our opinion, lies Professor Ussing's strongest line of attack, and it is the least easy for those to refute who do not hold professorial rank in the humanities.

After a tribute to the work of C. F. L. Schultz, of Wetzlar, as a pioneer in the exposure of Vitruvius, the writer plunges into the philological argument without much preliminary. On the general subject of diction he is prepared to argue that a styleless author, who makes a claim to be placed chronologically in the age of Augustus, thereby rules himself once and for all out of court. This we can hardly accept without modification. We do not believe Professor Ussing would find support among the students of the classics for the view that it was impossible for a writer to put pen to paper in the Augustan age without producing high-class classic Latin. For our own part we disbelieve the notion, and are quite prepared to discover that an ordinary craftsman, even if endowed with literary ambition might perpetrate in the first century A.D., or just before it, those blemishes of style and diction which to-day sometimes characterise the prose of clerks of works and even (shall it be said?) of architects. Professor Ussing, indeed, mentions as a sort of *reductio ad absurdum* the conclusion that the authors of the Golden Age did not write the real living Roman tongue, but a conventional literary language. This suggestion which, to be sure, embodies the characteristics of other golden ages, we believe to be no absurd fancy but the fact.

It is not, however, upon this ground only that Professor Ussing is willing to base the weight of his philological argument. His considerations of Vitruvius's language in detail put forward an array of solecisms which are uncomfortably germane to his argument.* Worse than this, the peculiarities of style are not merely personal oddities of expression; they in many cases are said to find their parallels and counterparts in usages prevailing at a later day. Augustan Latin is the perfection of synthetic language. Structurally, as we know, the Romance and later European tongues differ from this pure Latin by the substitution of the analytic for the synthetic system; and the failings of Vitruvius are thought to be in the analytic direction, and therefore evidences of lateness.

We cannot accept every step of Professor Ussing's detailed denunciations. *Ignotitia*, *indecentia*, *nascentia*, and the like are, indeed, words that no conscientious Latin dictionary admits, and we should be sorry to hear that our boys had put them into their Latin prose, yet we fancy that the tendency which they represent is one of which the rudiments are to be found even in so great a writer as Tacitus. Tacitus, of course, outlived the first century; so we cannot press that point, but he is not to be put down as hopelessly unclassic.

Among particular words and phrases chosen to enforce the argument there are several which we should venture to pick out as unnecessarily strained. The use of *Notitia* as meaning "renown" is not unknown to the classic writers. Ovid certainly uses it once in this sense, though to be sure Ovid is not writing prose. The substitution of *videtur* for *placet* occurs at least twice in Cicero; *aliter* with a stronger sense than "otherwise" has, we believe, occasional precedents; and *forte* as the equivalent of *fortasse* is certainly known to Cicero again.

Earlier critics have noticed the inferiority of the language of Vitruvius, and have put it down to want of erudition on the part of the writer, for whom they have claimed that he was, like other men of action, probably more skilled with the tools of his trade than with the pen of a ready writer. To this argument Professor Ussing replies with the contention that Vitruvius is by no means a modest writer, and that his language is not that of unassuming commonplace, but shows a certain ostentation which in the Augustan age would have been bound to be accompanied by style. Happy age! In our own time, alas, bombast can go with bad grammar and indifferent syntax. Ambition is not the equivalent of power even in literature.

If it can be proved indisputably by Professor Ussing, to the satisfaction of those who make it their business to know the facts of the chronology of language, that the solecisms of Vitruvius are without any doubt the characteristics of late date, he will certainly have given our old hero a blow from which he will find it difficult to recover. Our hope is that it may still be proved, as it used to be thought, that his irregularities of grammar, etymology, and syntax are the result of incomplete cultivation and possibly of rural life. The contention more than once put forward by Professor Ussing that Vitruvius was a non-metropolitan favours this hope, and it may even be brought to remembrance that critics *have* been known to consider the style of Vitruvius too *early*, not too late, to be Augustan. "His style," says one writer, "has much more of the *rudeness* peculiar to the Latin tongue in the times preceding Augustus than of the corruption which made itself noticed in the subsequent epoch of Seneca, Pliny, and Tacitus. Obsolete expressions," he says, "like *donicum* for *donec*, and *quot mensibus* for *singulis mensibus*, ally him in style to Ennius, Pacuvius, and Lucretius, the early writers whom he mentions with so much favour."

In regard to this very important argument based on style, we wish, in conclusion, merely to offer two observations. The elder Pliny died in 79 A.D., and had been writing for thirty years or more. Dr. Ussing gives us special opportunities of studying some of his passages in parallel contrast with Vitruvius, and we are bound to admit, not on these evidences alone, that his style for a writer of the period strikes us as execrable. Pliny, in fact, would appear to prove that a *savant* of the first century could write Latin that would not win a public school scholarship. Secondly, we consider that an intelligent forger of the qualities presupposed in Dr. Ussing's pseudo-Vitruvius would probably have written better prose than that of the *De Architecturâ*, even in the third or fourth century. Macrobius, who was alive at the end of the later century, can give Vitruvius heavy odds in style and syntax. If Vitruvius is not to be tolerated at the close of the first century B.C. because other men then wrote better prose than he, no more can he rest easy in the fourth or fifth A.D. Must he be made to move on through century after century till, with Schultz, we eventually commit the anachronism of placing him in the century succeeding the Harleian Codex?

If we are to lose Vitruvius as an Augustan writer, we are ready to fall back for solace on Vitruvius the centre and idol of a triumphal progress of publication dating from the dateless volume of Sulpicius, which appeared about 1486, and was continued through four centuries by the production of one beautiful edition after another. But the time for such solace is not yet. Vitruvius has been attacked; we do but await the counter-attack.

* We have intentionally completed the present article without reference to the criticism by Professor Baldwin Brown, recently published in the "Journal R.I.B.A." We look upon Professor B. Brown as one of the principal British Vitruvians, and are glad to note that he agrees in resisting Professor Ussing's attack, but observe with disappointment that with regard to the detailed criticism of the language, where we had hoped for a particular expansion of the defence, the Professor, though admitting that he has studied and weighed the subject, keeps silence. We shall look forward to seeing his vindication of Vitruvius under this head at some later date.

NOTES.

Some Bills in Parliament.

THE shadow of a General Election is already on the House of Commons, and there is quite a rush to bring in bills which will show the electors how anxious members are to benefit them. Sir F. Flannery has given notice of a bill "For the Granting by County Councils of Pensions in Old Age." This, nakedly stated, would seem to be a measure for an increased system of outdoor relief. Mr. J. A. Pease follows with a proposal "To Authorise the provision of Cottage Homes for the Aged

Deserving Poor," which looks like bringing the workhouse into the village. Mr. H. Whiteley, not to be outdone, has a measure "For Establishing a National System of Old Age Pensions," which is practically the same as the bill of which Mr. J. Rankin has given notice. Finally, Mr. W. Foster appears with a proposal "To provide Pensions for Poor Persons over the Age of Sixty-five Years." We feel little doubt that a Committee will be appointed to consider the subject on which these several measures touch, and that this will be the sole result of this show of legislation, which, however, will no doubt be presently employed as electioneering advertisements, not only by those who actually bring in these Bills, but by any one who has spoken a word in their favour. At present it is clear, from the decision of Lord Rothschild's Committee, that there is no satisfactory way of providing any general system of old-age pensions, and it is probable that Parliamentary discussion will make this clearer.

The Public Health Act.

THE manner in which some persons enter with a light heart into litigation is really surprising, and the appellant in the recently reported case of Robinson *v.* The Sunderland Corporation appears to be quite a fighting litigant. That the law was dead against him is quite clear, yet he has done some service by placing a legal point in regard to the working of the Public Health Act beyond doubt. The Corporation of Sunderland, under Section 36 of this Statute, served a notice on Mr. Robinson to provide a proper water-closet and ash-pit. This notice was not complied with, and thereupon the Corporation applied to the Justices for an order under Section 305 to enable them to enter on the premises and do the necessary work. When the application was made to the Justices objection was taken by the householder that the matters to be done were not necessary; in other words, he tried to appeal to the magistrates against the opinion of the Borough Surveyor. The Justices decided that they could not go into the facts of the case, and it was against this decision that the householder appealed to the High Court, but without success. "There was no power in the magistrates," said Mr. Justice Channell, "to enter into the question of the sufficiency of the privy. . . . The Local Authority were the judges of the matter." On the present application it was sufficient for the Justices to see that the legal technicalities required by the Act had been complied with. This is obviously clear and sound sense. The proper time for the appellant to have gone into the merits of the case was before the matter came to the Justices at all, when the Local Authority had the question under consideration. If this were not so it would make the Justices judges of fact in regard to sanitary matters.

London's Gas Consumption.

SOME noteworthy statistics were announced at the recent half-yearly meetings of the Gas Light and Coke Company and the South Metropolitan Gas Company. The former company have gained a large additional number of consumers, but have nevertheless sold 2·1 per cent. less gas during the half-year. This heavy loss, which, as the Chairman pointed out, is equal to the total annual make of gas in such towns as Folkestone, Gloucester, Exeter, Worcester, and Bournemouth, is stated to be due to the unusual mildness of the weather; but it is probable that the extensive use of incandescent gas lights (using less gas per burner), the high price of gas in a great portion of this company's district, and the increasing use of the electric light in the City and West End, have been responsible for a great part of the loss in consumption. The South Metropolitan Gas Company, on the other hand, record not only a great increase in the number of consumers, but an increase also of 5 per cent. in the amount of gas sold. This company is fortunate in supplying a district in which the population is rapidly increasing, and in which there is little electric light competition. Both companies had to pay higher prices for coal, and still further rises are threatened.

River Pollution Conference.

A PRELIMINARY conference on "River Pollution," held under the auspices of the Sanitary Institute, took place on Tuesday last, the 14th inst., at the Parkes Museum. There was a small, but influential, attendance, and the chair was taken by Sir Francis Sharp Powell, M.P., who has for many years had charge of a Bill dealing with the subject. Several resolutions were passed, but the subject which exercised most ingenuity amongst the speakers was as to which should be the authorities to carry out inspections of sources of water supply—the Local Sanitary Authorities, or the County Councils. It was argued that Local Sanitary Authorities were best, for the reason that they are always on the spot, and are likely, in consequence, to detect pollution more quickly than the County Councils. Champions of the latter maintained that in the majority of instances the pollution was carried out by the members of the District Councils themselves, who were not likely, therefore, to condemn their own actions. Eventually it was resolved that "For the purpose of inspection, and of taking samples for examination, the officers of Local Sanitary Authorties, including County Councils, shall have free access to any land and premises from or through which water is supplied for domestic purposes to the public in their districts." Another resolution which, amongst other things, proposed that the reports of the water inspectors should be published, was amended on the ground that the publication of such reports might from time to time unnecessarily scare the public, and it was ultimately resolved that the inspectors should only communicate their reports to the authorities concerned. Major Lamorock Flower subsequently expounded his well-known views in regard to watershed authorities, largely based on his experience in the Lea watershed area; and a resolution was passed which proposes that authorities be appointed for each gathering ground or group of gathering grounds of the kingdom, for the general care and supervision of the waters within each respective watershed. We thoroughly agree with this resolution, but it seems to be in conflict to some extent with the resolution already passed at the meeting, which proposed to give the power of inspection, &c., to already existing bodies. Sir John T. Hibbert, in proposing that the conference should approve and support the Rivers Pollution Prevention Bill, to be introduced into the House of Commons by the chairman, gave some interesting statistics as to the beneficial action of the Mersey and Irwell Watershed authorities, of which he is the chairman, in preventing pollution of those rivers. Altogether the conference was a useful one, though there seemed to be a disposition to give every speaker what he wanted, instead of adhering to any particularly strong policy.

Debate on Electric Wiring Rules.

THE debate on electric wiring rules at the Institution of Electrical Engineers was continued with renewed vigour on Thursday night of last week, and many had to content themselves with sending what they had intended saying to the *Journal*. Mr. Raworth, in an amusing speech, inveighed against the grandmotherly legislation of municipalities, and pointed out that although there was a municipal gas supply at Manchester, yet the gas consumers were not subjected to severe restrictions and rules like those which hampered the electrical consumers in their choice of fittings and apparatus. A swivel gas bracket between two lace curtains, or a water gasalier, are serious fire risks, yet the fire insurance offices do not issue rules for gas lighting. It was the opinion of several other speakers also that rules and regulations were only vexatious. Mr. Arthur Wright, of Brighton, thought that it was a very short-sighted policy on the part of supply companies to issue rules, as they only frightened the public. The municipal engineer should confine himself to keeping the pressure of supply absolutely constant, to seeing that the general leakage on his system was not too great, and to preventing any individual consumer from taking a large supply intermittently. Municipalities would be the first to grumble if the Board of Trade rigidly enforced their rules, and this ought to show them the folly of making rules for their consumers. Mr. Wordingham, of Manchester, in an able speech traversed the arguments that had been brought against the conclusions in his paper, and said that many of the speakers had been led away by their animus against municipalities. Rules were made for the benefit of the consumer, and were the only safeguard against jerry wiring. If rules were abolished we should be flooded with cheap German fittings, and a premium would be placed on inferior workmanship. At a late hour a motion was unanimously passed to invite all interested in electric wiring rules to a conference, which it was hoped would be successful in securing uniformity in rules.

Metropolitan Asylums Board.

CONSIDERING recent circumstances it is not surprising that the Metropolitan Asylums Board should have prepared a new form of agreement to be entered into with architects carrying out work for the Board. The main point of the agreement, and the motive for drawing it up, is evidently to be found in paragraph 7, which runs as follows:—

"7. The architect will not, in the construction of the works, allow or in any way countenance any deviation from or alteration in the said plans, drawings, elevations, and sections to be made, the estimated cost of which shall exceed 25*l.*; nor shall any extra or additional work (the estimated cost of which shall exceed the sum of 25*l.*) be begun by any such contractor until such deviation or alteration, or extra or additional work, shall have been approved by the Managers or by the Committee

And any order for any such deviation or alteration, or extra or additional work as aforesaid, shall be given to the contractor in writing, and shall, as evidence of the approval of the Managers or of the Committee be countersigned by the clerk or assistant clerk to the Managers."

We see no objection to this; in fact, it seems a very wholesome regulation; but we do not see why the Chairman of the Committee should have gone out of his way to sneer at the Institute of Architects and make the remark that "the Committee would have been more simple than he thought them if they had submitted the conditions to the Institute of Architects." If Mr. Scovell imagines that the Institute of Architects exists for supporting architects in every way against their clients he is mistaken. The Institute would be the very last to support its own members in anything that was not fair towards the public who employ architects.

The New Brighton Tower Case.

ON page 153 of our last issue there appeared a report, extracted from a Manchester paper, of an action brought by Mr. F. W. Maxwell, architect, of Manchester, against the New Brighton Tower Company, which ought not to pass without comment. The action was for fees due to the architect and damages for wrongful dismissal; the result was given in our report of last week, to which the reader may be referred. But in the course of the report it is stated that the architect "was to be paid for any additional work or deviations from the original plans, and he was to be entitled to receive the usual architect's commission from contractors." In the course of the case it was stated on the part of the defendants that they did not accuse the architect of having been bribed by the contractors or of having taken anything from them "unprofessionally"; but that he had received a commission or remuneration from contractors "to which, as a matter of law, he was not entitled under the agreement the company made with him." The company, or their legal advisers, seem to have been under the impression that there was some kind of commission from contractors to architects which was "usual," and that their architect was only to blame in having taken such commissions in contravention of the special terms of their agreement with him. They may be assured that they are entirely misinformed. There is no sort of commission from contractors to architects which is "usual" or is recognised by the representative body of the profession; and if Mr. Maxwell accepted any commission from contractors or tradesmen employed on the work he acted unprofessionally. The *Manchester Guardian* is reponsible for the statements made in the report of the case; and if they are not correct on this point, Mr. Maxwell had better, in his own interests, explain what are the real facts. That the expression the "usual architect's commission from contractors" should appear in a newspaper is derogatory to the whole profession, and indicates some serious misconception on the part of those who employed it.

The Louvre and the Luxembourg.

FOR several years the Colonial Department of the French Government has occupied the Pavillon de Flore at the Louvre, which has accordingly been cut up with wooden partitions and occupied with heating apparatus and other requirements for the use of the building as offices. The Conseil des Musées has now awakened to the idea that this state of the Pavillon de Flore, which is *en suite* with the Salle des États, constitutes a danger to the great national art collection, and has formally demanded that the Pavillon should be cleared out and made a portion of the Louvre Museum. It is to be hoped that the Government will accede to the demand, and prevent the possibility of a disaster which would be irreparable. It is also considered that the time has come to consider definitely what is to be done about the Luxembourg Museum, the whole of the wall space of which is now occupied; moreover, the part of the building now used as the museum, formerly an orangery, is by no means a safe building, in a structural sense, for keeping a valuable collection of pictures in. It seems not unlikely, therefore, that the erection of a new gallery for modern works of art will shortly have to be entertained.

Dudley Gallery Art Society.

THE thirty-fifth annual exhibition of water-colours by members of this Society, at the Dudley Gallery, contains the usual tolerably large proportion of what may be called respectable works, which are up to a certain standard of execution, but in which it is impossible to take any particular interest; the reason being that their authors have taken no particular interest in them; they are painting without strong feeling for the subject or decisive effort to make the most of it. Among the more original and true works several are by lady members; Miss Margaret Bernard, for instance, whose "Giddy Lake, Wimbourne (43; is not "lake" a mispriat for "lane"?) is a really good composition, and her "Weavers' Houses, Billericay" (60), a fine piece of colour. Miss Mary Stormont's "The Lock, Rye" (51) is an effective small picture of the "vignette" type. Among larger works Mr. C. J. Adams treats his groups of cattle admirably in "Contentment" (55) and "A Farmyard Corner" (64). Mr. Howard Stormont's "Risen—the Harvest Moon" (73) is a picture of real feeling and beautifully composed both in regard to lines and lighting, only a little conventional in tone, in a manner which reminds one of the late Alfred Fripp. Mr. R. A. K. Marshall is also somewhat conventional in the style and composition of his landscapes; nevertheless his "Looking to Dallington" (178) and "Evening After Rain, Hurstmonceux" (185) remind us agreeably of an older school of landscape—careful and learned, and having somewhat the effect of large pictures reduced to a small scale. Mr. George Marks is as good as usual in his beautiful little works "The Edge of the Heath" and "The Way to the Fold" (209, 219), the former especially. Mr. F. G. Coleridge paints miniature Thames pictures as before; pretty, but not so true as Mr. Dixey's "Wargrave Backwater" (181), which is really like the Thames. Mr. de Moleyns has realised a powerful effect in his painting of "Sunset Glory" on the houses on the old bridge at Kreuznach (83). Among other works worth attention are "On the Ayrshire Coast" (248) by Mr. R. Wane; Mr. Berenger Benger's "A Sussex Vale in December" (252) a really fine little work, original in treatment and colour; Mr. Nigel Severn's "H.M.S. *Terrible*" (221) in which the great warship is rising over an Atlantic swell in very real style; Miss Beatrice Smallfield's "A Sunny Bathing Corner" (115), good both in the figure painting and the bit of strongly lit landscape; and Mr. Newton Benett's "The Allotments, Dorchester" (32). Mr. Medlycott has made a better picture of St. Paul's (109) than some of his previous ones, but he has not yet achieved drawing the horizontal curves of the dome cornices and string-courses in true perspective.

Mr. Wilfrid Ball's Exhibition.

MR. WILFRID BALL'S small water-colour drawings in North and East Anglia, at the Fine Art Society's Gallery, without presenting anything remarkable, are an interesting set of landscape studies in a good, true water-colour style. All those in the neighbourhood of Danbury are good, and all have a certain colour-scheme of their own, differing from most of the other drawings, as if they had been done under some special impulse. Among the other little drawings we noted specially "A Morning Mist—Robin Hood's Bay" (17), "Suffolk Marshes" (22), "Norfolk Uplands" (74), with a grand cloud rolling across the sky; "Ploughlands, Essex" (88), and "The Old Inn, Sandsend, Yorkshire" (108). The small but interesting collection of Japanese works of art, in the front room at these galleries, should not be overlooked.

"Switzerland in Sunshine and Snow."

THIS is the title of a collection of water-colour drawings by Mr. Harry Goodwin, exhibited at Messrs. Dowdeswell's. These are to a great extent attempts to render special effects of sunshine and mist in Swiss scenery, and their general style is rather pretty than vigorous; but there are some happy exceptions. "Berne, Evening" (26), is a really fine little picture both in general effect and in the making out of the buildings; indeed, one would almost expect to find the name of Mr. Albert Goodwin attached to it. In "Silver Sunshine on the Schreckhorn" (11) there is an admirable effect of sunlight on the foreground grass; "Brieg—in Sunshine and Shower" (43) is an effective panorama of a landscape seen amid shifting lights; and in "Old Road over the Simplon" (23) and "A Mountain Chapel at the foot of the Matterhorn" (64) the background mountains are painted with more force and solidity than in most of the other works. A careful drawing of the old "Kapell-brücke" at Lucerne is of some architectural interest.

The Dutch Gallery.

THE small exhibition of sculpture, designs, and drawings "for fountains, vases, and for the decorations of gardens," at the Dutch Gallery, 14, Brook-street, is rather disappointing. The exhibitors are only three—Mr. Legros, who is by far the largest exhibitor; M. Lantéri, and the Countess Gleichen. Mr. Legros exhibits some carefully executed heads in "point d'or," or what is generally called silver-point in this country, but hardly of any special interest; his sketch in crayon for a fountain basin—somewhat in the form of a Greek cylix, with infants' heads at the upper portion of the rim and scroll-work below, is a pretty suggestion in design. The decorative masks and other similar studies exhibited are not very far removed from the commonplaces of this class of work. The honours of the exhibition are with the Countess Gleichen; her sketches for foun-

tains combined with sculpture are graceful; the sundial, supported on the shoulders of three seated figures of the Fates, is an original idea; and the model for a well-head, one-sixth scale, to be executed in stone with a wrought-iron carrier for the chain and bucket, is the best thing in the collection. The well-head takes roughly the outline and proportions of a capital, decorated with water-flags and with a crouching figure of a nymph under each angle; the wrought iron-work is treated with great vigour and freedom of line.

New Mosaic at the Houses of Parliament.

WE are glad to see that the space in the octagon hall of the Houses of Parliament, opposite to that occupied by Sir E. Poynter's mosaic of St. George, has been filled by another mosaic from the design of the same artist, illustrating St. David, as symbolical of Wales, with allegorical figures as supporters on each side, and a kind of decorative predella below. It now remains to complete the two other similar spaces with mosaics of St. Patrick and St. Andrew, and the four constituent peoples of Great Britain will then be decoratively represented. It is to be hoped, for every reason, that Sir E. Poynter will be commissioned to carry out the two remaining designs also; unity of style being an important consideration in such a work. That the new mosaic, as we have seen it remarked, has not attracted much attention is due to the initial mistake of combining stained glass and coloured mosaic in the same scheme of decoration. Coloured decoration may be introduced by transmitted light (through the windows) or by reflected light (on the walls), but the two can hardly be combined on equal terms; the stained windows tend to kill the mosaic. The scheme having been commenced, however, it is desirable that it should not be left half-finished.

The Leighton Bequest.

LORD LEIGHTON left, it appears, a bequest of 10,000*l.* to the Royal Academy, of which that body has announced the intention of making use in a manner which will commend itself to every one. The fund is to be administered as a trust, and the income to be spent in acquiring or commissioning works of decorative painting, sculpture, and architecture; the paintings to be placed in public buildings; the sculpture in or on public buildings or in the open air; the architectural commissions to be in the form of fountains; seats in marble, bronze, or stone; lamp-posts, and other objects for the adornment of public places. It is to be hoped that this will assist in initiating a better artistic taste in such objects in our public places; and certainly no method of employing the fund could be more in keeping with the known tastes and wishes of the donor.

HARROGATE ROYAL PUMP-ROOM COMPETITION.

THIS competition presents some unusual features, inasmuch as the competitors have been invited to submit designs both for a simple enlargement and for an entire reconstruction of the same building, as well as suggestions for the general treatment of its surroundings. With instructions of a scope so wide, and no limitations upon entrance, it is not surprising that as many as fifty-one sets of drawings were received. These were exhibited last week in the Winter Garden of the Royal Baths (an admirable place, by the way, for such an exhibition, affording ample space and abundant light—advantages often sadly lacking on similar occasions), and formed certainly as varied, and possibly as interesting, an assemblage of designs, as were ever brought together by the attraction of the comparatively small projected outlay of 8,000*l.* The problem set to be solved by the Corporation of Harrogate, the promoters of the competition, was in itself of the most uninspiring and barely utilitarian description. It was simply to provide more room than at present exists for the serving-out of medicinal natural waters to the crowds of visitors who resort to Harrogate during "the season." The existing building covering the outflow of the much-sought-after sulphur springs consists of a single octagonal hall, 34 ft. in diameter, with a counter, also octagonal in form, in the centre, from which the waters are dispensed. As is pointed out in the instructions to competitors, the daily concourse of from 1,200 to 1,300 water drinkers, all of whom arrive at about the same hour of the day, in this confined space, with such inadequate accommodation, produces much inconvenience. To remove, or at least to lessen, this inconvenience somehow, the Corporation have agreed; but whether anything should be done which would involve the disappearance of the present Royal Pump-room has, apparently, been the subject of a serious controversy. And hence the alternative programme and two sets of premiums of the competition.

The result of the awards by Mr. George Corson, the assessor, was published in our last issue. They mark a compromise, for by arranging to ask competitors to show how they would enlarge the old building, as well as how they would build a new one in its place, two conflicting sets of opinions have been reconciled. To take the bull by the horns and build a new "pump-room," as well adapted as possible to its purpose in every way, and quite unfettered by any reference to the late one, would seem to the ordinary mind the wisest course to pursue in the circumstances. But there exists in Harrogate, for some mysterious reason quite unintelligible to the mere outsider, a strong attachment to the very fabric of the existing structure; plentiful evidence was forthcoming in the remarks made during the exhibition of the drawings that many influential inhabitants cherish their pump-room with quite a tender, sentimental regard, which would be most estimable if only the building, the object of such affection, were in any way worthy of it. It is very likely that the place has had a great deal to do with the material prosperity of the tradesmen of the town, but to treat it in consequence as if it were an ancient building worthy of preservation for its beauty and its associations is absurd; and if the Corporation of Harrogate, after evoking such a really excellent response to their request for a *new* pump-room, should after all decide, as there seems some reason to fear, to throw all these designs overboard, and merely add on to the present commonplace building—which, by the way, is in bad repair externally, owing to faulty selection of stone—their procedure will verge on the ridiculous.

A special point of interest about the designs sent in for the re-building scheme was that, partly as best suiting the site, at the intersection of several streets, and partly, no doubt, influenced by the octagonal form of the existing building, the majority of the competitors had adopted perfectly regular plans, forming simple geometrical figures—circles, triangles, squares, hexagons, octagons, dodecagons, all being represented—such as are seldom seen in competitions for actual buildings, at any rate in this country. A dome, or at least a high central roof, was an essential element of every design. In the matter of style the promoters had closely followed Lord Palmerston in his views as to public buildings in London: they were not particular as to what sort of architecture was employed, so long only as it was *not* Gothic; that was definitely prohibited. The general effect of the exhibition had, consequently, a striking resemblance to the annual show of drawings submitted for the Tite Prize (for the promotion of the study of Italian architecture) at the R.I.B.A.; indeed, several of the Harrowgate designs might, with very slight alteration, have been appropriately sent in for the subject of this year's prize, a Royal Mausoleum, so severely monumental was their expression, and withal so gloomy. It was curious, though, to notice how very far from *classic*, according to the true meaning of that word, were many of the so-called "Classic" designs; it seems to be easy enough to evolve something which no one could call Gothic, but to be quite another matter to achieve the really classical.

The first premiums, alike for a new building and for a scheme for enlargement, have been awarded to Mr. J. Anderson, and, weighing all the circumstances, we do not think that a wiser choice could have been made. These designs do not stand out from the crowd by reason of any special excellence, and there is certainly much better architecture displayed in some of the others; they neither call out strong admiration at the first glance nor grow into one's appreciation on further study; but, on the other hand, they have the merits of being straightforward, workable, and possible for the money; they have no conspicuous failings or extravagances; and they would probably be acceptable to the promoters and the public. For his new building, Mr. Anderson shows, standing on the site of the present Pump-room, a dodecagonal hall, 50 ft. in diameter, with small, low projections from the sides for offices, &c. The principal entrance and exit are on opposite sides. In the centre is a fountain surrounded by an octagonal counter, and there are also counters projecting from three of the sides. A large dome, of similar horizontal section to the hall itself, covers the whole of it, and is formed with a flattish elliptical inner vault, apparently of stone, and a much higher lead-covered iron-roof, the latter carrying a lantern of good proportions. The building is treated, both externally and internally, as of two stories, with a separate order to each, the lower one embracing the wings and being comparatively plain and massive, while the upper one forms the drum of the dome, and is pierced with large, round-headed windows, so that the interior is sufficiently and cheerfully lighted, a point which several of the competitors have distinctly missed. The winner of the second premium (Mr. Arthur A. Gibson) sends two alternative plans, one circular, the other octagonal, of 57 ft. and 50 ft. in diameter respectively. Of these only the former is accompanied by elevations and sections. Both of them cover more ground than does the successful design, the circular plan having the additions of a colonnaded portico and two flanking towers, and the octagonal one those of a covered promenade 100 ft. long by 25 ft. wide, placed tangentially in front of it, and a reading-room of about 25 ft. square. These plans are very well thought out, and if they could be carried out for the money would probably produce the most satisfactory building of any in the competition; more especially is this the case with the one having the adjunct of the long gallery, which would prove of much practical advantage, affording space for sitting at small tables, as at Bath, in addition to the standing room in the central hall. But this competitor has damaged himself by the unpractical character of his elevations. They are distinctly interesting, much more so than those just mentioned, and equal in this respect to any in the exhibition, but besides being somewhat more grandiose than the occasion warrants, they are of a character which must be "caviare to the general," and therefore have little chance of being accepted. The general idea seems to be a diminished and modernised version of the Pantheon, so far, at any rate, as regards grouping (as it was before the "asses' ears" were removed), and though most of the work is clever, refined, and well put together, one can hardly be surprised that the design as it stands should not recommend itself for execution. The competitors placed third (Messrs. Eade & Johns) show a still larger and more ambitious building, covering at least three times the area of the existing one. The plan comprises a central hall 40 ft. square, with two smaller ones 36 ft. by 25 ft. opening out of it on either side, the total length being 94 ft., besides projecting offices. Externally the building is treated as of one story, with a low octagonal dome, surmounted by a tall lantern, rising over the central hall. The design generally might be described as vernacular Anglo-Italian of the railway station type, and has nothing about it worthy of commendation. The authors show also an alternative scheme, somewhat smaller, but similar in treatment.

In the other part of the competition Mr. Anderson again wins the first place with a reasonable and businesslike scheme, by which he leaves five sides of the present pump room intact, and extends crosswise behind it an "additional hall," 81 ft. 6 in. by 24 ft., which gives three extra counters, the triangular spaces between the old and new buildings

being filled in and utilised. The new hall is of five bays, with cross arches between, and a dome and two semi-domes in each bay. Dormers are inserted in the roof of the existing building, which otherwise is left as at present. The second premium has unaccountably fallen to one of the weakest and worst sets of drawings to be seen in this exhibition, or which, indeed, ever won a premium in any competition. This award was certainly a mistake, and many competitors better deserved the place. The planning of Messrs. Hunt & Shield, who receive the third premium, is altogether better than that of the winner of the second, and although, as we have said, we cannot think it worth while to make any sacrifice for the sake of retaining a portion of the present building, it must be allowed that their idea of turning the regular octagon into an elongated form, and so doubling the floor space, is ingeniously worked out and well adapted to meet the views of the ultra-conservative section.

Among the designs, too numerous to criticise severally, by unplaced competitors, a few deserve particular mention for the really good architectural quality they show. The enlargement scheme, naturally, did not attract the best men, but of the designs for a new building those by Mr. F. Musto (in plan pseudo-elliptical), Messrs. Ashley & Armstrong (octagonal), Messrs. Tapper & Crouch (hexagonal), Mr. R. T. Beckett (octagonal), and Mr. W. T. Morley (Greek cross form), are distinctly meritorious, and we should have been glad if any of them had received premiums. On a lower level, but of interest in some respects are the designs of Messrs. Murray (triangular), Hall, Cooper, and Davies (circular), Taylor (Greek cross), Wilson (circular), Ambler & Son (pseudo-elliptical), H. and A. Bown (dodecagonal), Marshall (pentagonal), Stevens (Greek cross), and Edwards (triangular). It may be noticed in conclusion that in dealing with domes it is a fatal mistake, but one, in this instance, fallen into by many of the competitors, to make the ground story so low in proportion to the size of the dome, that the latter appears quite to crush the rest of the building, and however large in itself realises but a squat, mushroom-like effect, entirely losing all the dignity and beauty which almost inevitably attach to any dome reared high into the air.

GREEK ARCHITECTURE.*

THE ORDERS: DORIC.

IT may seem strange to you that I should treat of the orders when the students here are advanced from their preliminary studies and have entered into the mysteries of composition; but this is not the view taken in France. At the exhibition at the École des Beaux Arts at Paris, 1887, there were quarter full-size drawings of one of the capitals of Mars Ultor, consisting of plans, elevations, sections, and perspectives by one of the students at Rome.

We entered on this course with a distinct view of trying how we could best improve our powers, and get imbued with those principles of proportion, of grace, elegance, and distinction which we could apply to the work we may have to do. All the problems we have to solve in architecture are to make our building fit for its purpose, and to seem fit, and when we have so made it, to see how the various parts of it are to be proportioned, to see how they may form a rhythmical whole, and that they have their proper adornment. A building consists of parts, mostly vertical or horizontal; these parts have their necessities and proprieties, and we ought always to give them character, and beauty when it is consistent with their use. By necessities I mean their height and bulk and, to some extent, their shape; by their proprieties I mean the due expression of the office they have to perform; for instance, a cornice has to shelter; a window-jamb, in this country, to exclude as little light as possible; a pier or column to support a load. By character I mean the proper æsthetic expression for its use and place, and for according with the building. The pier of a prison would be out of place in a church, a picture gallery, or a palace; and the column from one of the last-mentioned buildings, on account of its elegance, refinement, and ornament, would be out of place in a warehouse, where it fulfils a merely necessary duty, though it should not be without its proper character. The study of the orders teaches us how these parts have been treated, so as to have proportion, grace, and beauty; and they have been objects of admiration for over two thousand years. For many centuries columns and their entablatures, even when not wanted, have been used as ornaments to buildings, so that it would be hard if we could learn no lesson and get no hint from their study.

In Plato's "Philebus" Socrates says: "If we are not able to hunt the good with one idea only, with three we may take our prey, and character, truth, and symmetry are the three." Symmetry is what we call proportion.

We turn to Vitruvius to see what he says on the subject of the Doric column, for it is of that order that I treat to-day. It may not be amiss to again marshal the claims of Vitruvius to be considered as an authority on Greek architecture, and on the methods pursued by the Greek architects in getting the proportions of their buildings. We know from him that he had read many of the treatises of the Greek architects; these treatises have perished, and Vitruvius is the only architect whose works have come down to us who has read them. He uses Greek words, too, to explain the technical terms. He was probably bred as an architect, as he speaks of what his masters had taught him. He was a practising architect, for he tells us that he built a basilica at the colony of Fanestrian Julia, on the east shore of Italy. There is also some reason to believe he was with the army of Julius Cæsar, and he tells us that Augustus made him an inspector of artillery. His mention of the shifting of the triglyph, from the angle of the building to the centre of the angle column, his objection to the Greek plan of narrowing the angle intercolumniation, and his other remarks about Greek buildings and temples, show that he was acquainted with the Greek practice, though he evidently considered the Roman method the best.

We have not, however, the smallest reason to suppose that he is giving us the Greek traditions of the days of Pericles; the utmost we can hope is this—that as Roman architecture was borrowed, as far as its construction went, from the Etruscans, and, on its art side, from the Greeks, that the Greek rules in force when Vitruvius wrote were the old Greek rules, only modified to meet the current wants and tastes, and, afterwards, to suit Roman tastes and Roman requirements. Even if the ruins of Greek buildings did not prove that Vitruvius' rules did not apply to them, we should infer it from the considerations before stated. All we can hope is that he gave us roughly the Greek methods adapted to Roman views. As regards Vitruvius there are two points that must be borne in mind—first, that his treatise was dedicated to Augustus, and was for the reading of the nobility and gentry. It was founded on the model of the cubic verses of Pythagoras, and was meant to be as short as possible to aid the memory; were it not for this we could never forgive an architect for not telling us how the temples were lit, but every Roman gentlemen and every man whose parents wanted him to be well taught was sent to Athens. We know Augustus went there, and was a contemporary student and "chum" of Virgil.

Horace, whose father is said to have been a tax-gatherer, was also there, so Vitruvius might have thought it was unnecessary to say how Roman temples were lit at home, or how Greek ones were lit abroad, because all his readers knew that as well as he did; secondly, it was an illustrated book, and all the illustrations have perished.

He lived before archæology had become a science, as well as before anything was known of chemistry or geology; so that no story about the causes of things is too idiotic for him to believe and repeat. Some of you may have read the early treatises on Gothic, where the late stellar groining was attributed to the savages who overran Europe, wanting to reproduce in stone the effects of their native forests.

Vitruvius' accounts of the origin of buildings and of their parts are quite as sensible and credible as this. He is only to be depended on when he speaks of what he has seen, of the methods he has learned, and of the experience he has had. If I give his cock-and-a-bull stories it is because they were implicitly believed by the Renaissance architects, and may possibly be found repeated in the architectural literature of the present day.*

You are not to suppose, because I make these remarks, that I am unconscious of the value, or despise the writings, of Vitruvius, for he has not one, but many titles to respect. That his work has survived for more than 1,800 years is alone a title, that it is the only technical treatise on our art that has illuminated that vast tract of blackness from the days of the building of the pyramids and of Solomon's temple by "the son of a woman of the daughters of Dan," down to the beginning of the fifteenth century, is another (for the sketch-book of Wilars de Honecort is not a treatise); that it is written by the only man we know who has read the Greek treatises on architecture is in itself a sufficient title.

That he has preserved the name of innumerable Greek architects, would be alone a reason for reading him; that his work was the *vademecum* of the mediæval, architects and that Milan Cathedral was designed according to his rules, was another; that were it not for him we should be as ignorant of Roman methods as we are of Greek is an additional title; but it is as the only ancient who has described the architect's qualifications that he is the best entitled to our gratitude and respect. Addison takes up the cudgels on our behalf against Martial, on the testimony of Vitruvius.

"It is generally the method of such as are in love with any particular science to discover all others in it. Who would imagine, for example, that architecture should comprehend the knowledge of history, ethics, music, astronomy, natural philosophy, physic, and the civil law? Yet Vitruvius will give you his reasons, such as they are, why a good architect is master of these several arts and sciences—sure, says Cynthia, Martial had never read Vitruvius when he threw the crier and the Architect into the same class:—

> 'If of dull parts the stripling you expect
> A Herald make him, or an Architect.'"
> (Addison's Works, by Tickell, 1777).

He has, however, another title which I was well-nigh forgetting, though I do not recollect it even being mentioned before, and that is that he had possibly been read by St. Paul. Newton translates the passage (Lib. 1, cap. 4, par. 7) as follows:—"For the species of birds have one constitution, fish another, and the terrestrial natures another far different." St. Paul says, 1 Corinthians, cap. xv., verse 39, "But there is one kind of flesh of men, another flesh of beasts, another of fishes, and another of birds." I think we may safely say that if St. Paul had not read Vitruvius, they had both borrowed the passage from the same source.

I gave you in the last lecture the system adopted, according to Vitruvius, to get the general proportions of buildings, because the module or measure was got from them, and not the building from the module.

Vitruvius tells us that when the Ionian colonies were settled in Asia Minor, they began to build temples, the first of which was dedicated to Apollo Paionios, and resembled what they had seen in Achaia, and they gave it the name of Doric, because they had first seen that species in the cities of Doria. As they wished to build this temple with columns, and had no knowledge of the proper proportion, and did did not know how to build them so as to be fit to carry the superincumbent weight, and to produce a beautiful effect, they measured a man's foot, and finding its length the sixth part of his height they gave the column a similar proportion, *i.e.*, six times the thickness of the shaft at the bottom; the successors of these people improving in taste and preferring a more slender proportion assigned seven diameters to the height of the Doric column. He says (Lib. 4, cap. 3): (3) "The front of a Doric temple in the case in which columns are determined on is to be divided, if tetrastyle into twenty-seven parts, if hexastyle into forty-two parts, one part of this will be a module, which in Greek is called Εμβατης, from the module so formed, the distribution of all the parts is regulated; (4) the thickness of the columns will be two modules; their height with the capital, fourteen; the height of the capital one module; its width two and one-sixth modules" (and I presume that does not include its cymatium). "Let the height of the capital be divided into three parts, then one of the parts is to be for the abacus, and its cymatium, another for the echinus with its fillets, the third for the hypotrachelion (or necking). The column will be tapered as is written in the third book about Ionic

* Professor Aitchison's third Royal Academy lecture delivered on Thursday, February 9.

* See Gwilt's Encyclopædia, 1881

columns, the epistylium (or architrave), with its tænia and guttæ, is to be one module in height, the tænia is one-seventh of a module, the length of the guttæ under the tænia coincides with the triglyphs." (By this he means the whole row of guttæ). "Their height with the regula is one-sixth part of a module; the width of the lowest part of the epistylium is equal to the hypotrachelion of the top of the column. Upon the epistylium are to be placed the triglyphs with their metopes, one and a half modules high, one module wide on the face, so divided that in the angle and intermediate columns they are placed to correspond with the centre quarters of the columns, and two in the intercolumniations; in the middle one of the pronaos and posticum three. The middle intercolumniation being so extended, the entrance will be without obstruction to those going to the images of the Deities. (5) The width of the triglyphs is divided into six parts, of which five parts will be in the middle, the two halves will be arranged right and left; a flat piece in middle forms the thigh, which in Greek is called μηρος; next its channels are scored with the point of a square, other thighs right and left are placed in the row, in the outside parts, the half channels are slanted. The triglyphs being so placed, the metopes, which are between the triglyphs, are as broad as they are long; but at the extreme angles half metopes are impressed half a module in width."

(I presume he means this roughly, because, as columns are diminished one-sixth, and the architrave is flush with the necking, and is plain—*i.e.*, without the three fascias—it would leave but ten minutes instead of fifteen.)

"Thus indeed it will be, that all defects of the metopes, intercolumniations, and coffers will be cured, because they will be made of equal divisions."

(You see how the practical Roman got out of a difficulty that the artistic Greek made a beauty of) "(6) The capitals of the triglyph are to be made the sixth part of a module" (This cap seems to be included in the one and a half modules high).

"Above the capitals of the triglyphs the corona is to be put in projection one-half and one-sixth part of a module, having the Doric cymatium at top and bottom, the corona with its cymatia half a module thick."

"In the bottom of the corona to the perpendicular of the triglyphs and the middle of the metopes the direction of the spaces and the distribution of the guttæ are to be so divided that six guttæ may appear in the length and three in the depth: the remaining spaces, since the metopes are wider than the triglyphs, may be left plain, or carved with thunderbolts; at the chin itself of the corona, a line is to be cut which is called a scotia—all the rest, pediments, cymas, coronas, may be executed as is described before for Ionic buildings." This may seem curious to us, as Ionic was supposed to be later in Greece than Doric, and was not so popular; but Vitruvius knew that the later buildings in Asia were mostly Ionic, and that after Alexander the Great's time Asia became the most prominent part of the world until the Roman Conquest.

Though the Roman Doric must have been used, on account of his description of the shifting the triglyphs from the angle to the centre of the columns, we do not know of any example extant, except at Pæstum, earlier than the Theatre of Marcellus, built by Augustus and finished 11 B.C., except those to the arcade in front of the Capitoline Tabularium, about 78 B.C.

"(7) This method will be adopted in diastyle works, but if the work be made systyle and single-triglyphed, the front of the temple, if it be tetrastyle, may be divided into 18½ parts, if it be hexastyle into 28½, of these parts one will be the module according to which the work may be divided as is written above. Thus above each epistylium two metopes and two triglyphs will be placed: this is wider in the side ones; as much as the space of half a triglyph." The setting out for getting the module has different numbers in almost every new edition from 1486 down to the present day. In the "Editio Princeps," 1486, they are 28, 32, and 18, 28; in Jocundus, 1513 A.D., they are 28, 44, and 23, 35; it would weary you to go through the list. The learned Newton, our first real English translator, accepts Jocundus; and so does Gwilt. I have given them from Rose, as his edition appears to be accepted by scholars, though no one as yet seems to have solved the difficulty, even if he has been able to translate the last passage, about which the learned have disagreed for the last 400 years.

In this case of the triglyphs we are on the horns of a dilemma: if we accept Rose's numbers, we get the triglyphs and metopes right in number and width, but the last passage is incomprehensible, and the columns are not set the distance apart that Diastyle and Systyle prescribe. If we take Jocundus, Newton, and Gwilt, we get the intercolumniations right, but the metopes are all out of proportion.

The widening of the central intercolumination was not common in Greek temples, though there is some reason to believe it was adopted at the temple of Diana at Ephesus, but it was used in the propylæa of the Acropolis to get in the oxen that were offered in sacrifice, and in that of Eleusis you may see a one-triglyphed hexastyle Doric portico, with two triglyphs in the middle intercolumniation. There is, however, a barbarous temple at Cadachio in Corfu, where the centre intercolumniation is wider, it was supposed to be without triglyphs or guttæ, *i.e.*, Railton found no remains of either.

Vitruvius continues: "One must chamfer the columns with twenty chamfers, which, if they are flat, have twenty angles set out; but if they are hollowed, this is the way of doing it, as big as is the space between the markings: let a square be described with the sides as big as, and equal to the markings; in the middle of the square let the centre of the compasses be put and a circular line be drawn which shall touch the angles of the square; and as much curvature as there is between the rounding and the square, let so much be sunk out to the shape. Thus the Doric column will have the perfection of the fluting of its kind."

10. "Concerning its addition, which is increased in the middle (the entasis) as is prescribed in the third book for Ionic columns, so it may be transferred to these." If we have been correct in our supposition that Vitruvius' treatises gave the pith of the Greek treatises adapted to Roman requirements, you see that they dealt mainly with the general proportions, leaving it to each architect's taste and genius to vary the details pretty much as he pleased.

At the ruins of a peripteral temple at Thoricus, near the promontory of Sunium, the shafts of the columns are unfluted from about 3½ in. above the bottoms to the neckings; whether the Greeks got to like this, or whether the shafts were covered with tapestry, I know not. The important part tapestry played in antiquity is too often overlooked; you should read M. Louis de Ronchard's book on the subject. At Thoricus, the flutes are finished at the bottom, just as they are under the annulets of the capital. Professor Cockerell, and many of the French architects have used this form of column, and in certain cases the contrast of absolute smoothness of considerable length, with the little bits at top and bottom, which are much cut up, is not unpleasing.

Curiously enough there is a Greek Doric temple at Cora between Velitræ and Ardea in Latium, the columns of which have segmental flutes above, plain chamfers at the bottom of the shaft (this chamfering and fluting exactly corresponds with Vitruvius' description) and it has a double moulding for a base, *i.e.*, a fillet and a reversed cyma recta running into the torus without a fillet and a square plinth, the channels of the triglyphs are stopped by a square. The value of triglyphs was threefold; first, it called the note of the fluted columns into the entablature; second, by its rigid vertical lines it acted as a foil to the curved lines and modulated surface of the sculpture, and it contrasted with the long horizontal lines of the architrave and cornice. When the shafts were plain, it could carry no note of them into the entablature, it could not act as a foil to fine sculpture where there was none; but as barbaric ornaments they still afforded a contrast to the lines of the epistylia and cornice, and probably for that reason they have been occasionally used up to the present day. I do not know any one thing that marks the difference between Roman and Greek taste better than the triglyph; and that, too, when both nations were at their highest pitch of cultivation. The two are almost the same thing with very slight differences in their proportions and treatment; but while the Roman triglyph is utterly commonplace, the Greek is marked by elegance and distinction. Some of you may have seen illustrations to books of botany which cannot be said to be unlike the plants and flowers they represent, but every bit of the exquisite grace and distinction of the plants has been left out.

If you will compare a triglyph of the Parthenon with one at the Theatre of Marcellus, you can see by what slight alterations you can turn a very fine thing into a commonplace one. The one has certainly been done by an artist; the other might have been done by a carpenter. When you have learned to appreciate the difference, and will bestow the same thought and care on your own work, you will have to teach the public to appreciate it. At present they would say:—

> "Strange that such difference should be
> 'Twixt tweedledum and tweedledee!"

One of the most curious features of the Doric of the Greeks is the absence of a base; they had tried a base to it at the Temple of Olympian Zeus at Acragas, in the pronaos at Athené at Syracuse, possibly to the columns of the peristyle of Zeus on the Anapus River at Syracuse and at Cora in Latium—if this can be called Greek, as it was built under the Roman duumvirs about 80 B.C., the year Vitruvius is supposed to have been born. This tetrastyle temple at Cora is said by Piranesi to be dedicated to Hercules.

All the best examples in Greece, Ionia, and the Ionian islands, are without a base. The long sweep of steps, with their repeating horizontal lines, were better emphasised by the shallow flutes coming on to them direct, than by frittering away the horizontility by a base whose curved lines as seen in perspective would merely have softened off the contrast and made it less striking. The steps of the pronaos seen between the columns of the portico make a sort of wide dentilation which was repeated in alternation on the lower line of the architrave, by the square lines of the abacus This effect is reproduced by the regula, the shadows from the guttæ making a dappling that accentuated this part, and contrasted with the circular shields between. The triglyphs carry into the entablature the vertical lines of the flutes over each column and between them; the breaking of the upper line of the architrave is repeated higher up—four times by the mutules in the distance between the centres of the columns. Then the horizontal lines of the corona and its cymatium repeat those of the steps. The sloping lines of the pediment make a variation which prevents the composition from being monotonous. What the acroteria were at the Parthenon we know not, though we have Prof. Cockerell's restoration of this, but we know the triangular tympanum was filled with the curved lines and modulated surface of sculpture. This superb creation, the Doric temple, was sublime through its outline, proportion, contrast, and distribution of light and shade; every part was calculated to produce the effect desired in what seems to be the simplest but most perfect way, and every art and refinement had been lavished on it, and the effects of Greek sunshine had been studied and applied with the most exquisite skill. The simas crowning the pediment were the segments of a circle, the only part of a circle found in the mouldings, and therefore had a regularly graduated shadow, confined at the top and bottom by two narrow, but sharp shadows, and were capped with the bright light of the narrow top fillet and shoed with the wide bottom band, the latter a little more than twice the width of the top one, and below that you see nothing but the broad band of light formed by the inclined corona, with its soffit in shade, until you come to the sculpture of the tympanum; here you have all sorts of curved and angular lines, a modulated surface and dark shadows which contrast with the formal lines of the architecture, and are set off by it; then the horizontal corona capped by a hawk's-bill moulding. The horizontal line of its bottom is accentuated by another line, just below, to enforce it, and then come the bright faces of the mutules, breaking up the line of shadow, these having guttæ and an inclined soffit, break up the horizontal shadow from the lower member of the corona, and this edge again is broken by the guttæ. When the sun's rays are not vertical these shadows of the mutules have alternately straight and sloped ends, as they come down from the horizontal line of the corona, thus forming a jagged line, and they so fall on the sculptured metopes, and the channelled triglyphs, whose splayed channels make other jags. Remark, too, that the Greeks emphasised the angles of their building by the channelled triglyph, and did not, like the Romans, leave a weak place at the angles; in fact they could not when the Epistylium was of wood. In the best age, to better equalise the metopes, which in earlier work were wider at the angles, the

Greeks pulled together the last two columns, so as to strengthen the angles below the cornice, made the last column a bit bigger, and battered the lines at the sides.

As the capital was found worthy of the most minute care by generations of Greek architects, it must be worthy of our attention on account of its beauty and the art that has been employed in contrasting those forms, whose shades and shadows are the most striking in the whole structure.

I will describe the form of the column at the Parthenon, which is considered as the most perfect example. The column is round, but fluted with twenty shallow elliptical flutes, forming arrises at the junction, and these flutes are carried right up to the annulets following the apophagee; the column is, I should say, a trifle more than 5½ diameters high, and diminishes between ¼ and ⅛ = 4·598. A massive square abacus crowns the column, below there is the echinus with a sharp elbow under the abacus, at its bottom are the three annulets, viz., three small squares slightly projecting beyond the echinus, and at right angles to its curve and about twice their width apart, sweeping down from the lower edge into the curve of the echinus. The necking is merely a piece of the fluting cut off by deep indentation, and the height of the necking is nearly half that of the abacus; nothing sounds simpler, and I might say more commonplace, than this, yet when seen in sunlight, it makes one of the most perfect things man has yet invented. First there is the broad flat light of the abacus, the deep shadow under it on the echinus graduated down to the annulets, with their lights, shades, and shadows; but from the abacus being square, and the echinus and all below it being round, there is a sort of bay of light in the middle of the echinus, beautifully modulated, like the rising moon on a clear night; the flutes have a light and a dark edge and are all shaded but those facing the sun, till at last all are in shade, the angle of the abacus too makes a pointed shadow on the flutes of the light side, the dark line of the necking enforcing those of the annulets.

I cannot do better than to quote a passage from a letter of the late Professor Middleton on this subject, which will show that I am not singular in my opinion:—

"There is one point about the Greek Doric capital which struck me very much at Athens, while studying the Parthenon, and made me feel that it was really the finest of the orders, that is, the exquisite beauty of the shadow of the abacus falling on the echinus, giving with the movement of the sun an infinite variety of different forms to the contours and gradations of the shadow. After a time I got to feel that the Ionic and Corinthian capitals, beautiful though they are, were monotonous and dull compared to the varying subtleties of light and shade of the Doric cap. I think we can hardly realise the marvellous skill of the early Greek architects in designing their mouldings, so as to make all the shadows transparent, by means of light reflected from some adjacent surface."

It is mainly owing to the persistence of type that we have got such perfection as is exhibited in the Parthenon and Propylæa at Athens; doubtless the type gradually improved up to this point, and then deteriorated.

The Greeks in each temple varied the ratios of height to the width of the column, of the intercolumniation to the columns, the proportions of the parts, the contours of the mouldings, the method of finishing the triglyph channels, the forms of the guttæ, and the shape of the annulets.

One cannot help asking oneself whether this narrow groove in the Doric caps of the best age was not at first intended to take a bronze tongue, and whether the upper part of the flutes were not filled in with bronze leaves, as in some of the earlier examples. At the Erechtheum we know there were bronze ornaments in the flutes on the flank of the Ionic capitals.

Restriction has the same value in form as in colour. A Persian potter had only white, a dark green we may call black, a pea-green, an azure blue, a dark blue, and a purple; by varying these, in shape, size, and position, and perhaps slightly in tone, he made some of the most beautiful compositions in colour we have ever seen. Look at the restriction of forms in a flank entablature of a Doric temple. The mouldings are almost wholly composed of square sections, varied here and there with a sloped or a curved soffit. The regula is square, the tænia is square, the triglyph cap is square, the face of the corona is square, the mutule face is square, its soffits, it is true, are splayed and the corona soffit is curved; the only curved mouldings that occur are the cymatium of the corona, and one little bead above the triglyph cap; the plan of the triglyph is a square chanelled with a V shaped channel; the guttæ, it is true, are circular on plan, and slightly hollowed in section, and the heads of the triglyph channels are ellipses; but you have sculpture in the antifixæ and in the bead, figure sculpture in the metopes, and the whole gorgeous with colour. All this squareness above and below, for the steps are also square, forms a fine contrast to the circular columns, with their circular necking, annulets, echinus, and their elliptical flutes; here we have only one thing four square every way, the abacus.

You would probably laugh at any one who said to you "I want a sublime capping to a building, the parts of which shall be all square, except that a few of the members may be splayed or hollowed on the soffit. You may have one bead, or one or two mouldings, though these must be quite insignificant in size, and I will throw in some little bits sawn off a silk roller which you may imitate in stone, and if you make channels you may finish one end with an ellipse." Yet this is the Doric entablature.

There is nothing like restriction for bringing out all the faculties; you may recollect what Goldsmith said of the French, "that they would be the best cooks in the world if they had any butcher's meat, for they could make ten dishes out of a nettletop."

I strongly advise you to learn the value of squareness; and when you want dignity, see how few curved surfaces you can do with, and how little floral ornament, so that you can restrict your sculptor to do without floral ornament, and get a figure, a group, or even a head in its place. The Greek architect lavished so much care on the exquisite contour of his curved mouldings that he naturally grudged them for sculpture, preferred the painter's aid, and left the flat parts only to the sculptor.

A good many Doric capitals show the gradual restriction of the echinus from the bulbous examples in Sicily and Italy to the delicate curves of the Parthenon, until the echinus becomes a straight line at the Portico of Philip at Delos.

The colossal one at Zeus Olympius at Acragas is 15 ft. 10 in. across the abacus, and in one of the flutes of the shafts a man can stand. The columns at the entrance of the London and North-Western Railway are but 8 ft. in diameter. I also exhibit the proto-Doric one, from the Treasury of Atreus, which is supposed to be copied from a wooden one covered with metal, like the Assyrian metal work on wood that we see at the British Museum, and like the description of the columns, boards, and bars of the Tabernacle in Exodus (caps. 26 and 36). Herr Puchstein traces the early Doric capitals of Sicily and Pæstum (including one lately found at Xenarois, in Corfu) that have the fringe of leaves under the echinus, to the cap of the column at the Treasury of Atreus at Mycenæ, and he divides the Doric into kymatic and a-kymatic, an early example of the former having been found at Pergamon. He suggests that the kymatic arose from the application of terra-cotta to the original wood entablature, and this terra-cotta, he believes, was sometimes applied to stone. He suggests that some of these shapes of kymatia were suggested to the potters by the profiles of vases, and by their rims and feet.

Those who want to study Greek architecture archæologically, and to trace their comparative anatomy from the earliest to the latest times, must read Herr Puchstein's learned treatise on the Ionic order, and the works of Messrs. Bothelin, Jacobsthall, Dörpfeld, Chipiez, and others. Our object here is not to know how the forms arose, but whether they look well. It is impossible to say how the ornamental painting looked. The effect of the polychromy at the School of Athens is not disagreeable. Mr. Watts is, I believe, the only living artist who has ever seen a bit of Greek floral ornament painted in blue, yellow, and red; he saw this at Halicarnassus, and said it looked admirable. We can say of this piece of ornament that it was at least coeval with the destruction of the mausoleum.

The only allusion to the colouring of buildings externally I ever came across in contemporary Greek writers is in that oracular response from Delphi mentioned by Herodotus, and it is partly on this account that I have got the Guardian Fire Assurance to let me have a chromo of the President's drawing, though I may add that it gives you an idea of the extra magnificence added by colour and gilding to a building; but it is particularly on account of the red tint of the marble which he has so admirably shown. I must preface Herodotus' story by saying that the hulls of ships were painted red, that heralds were dressed in white, and that we must conclude buildings were ordinarily coloured red, and that the new buildings mentioned were not yet completed.

"Those of the Samians who had fomented the war against Polycrates, when the Lacedæmonians were about to abandon them, set sail for Siphnos, for they were in want of money. The affairs of the Siphnians were at that time in a flourishing condition, and they were the richest of all the islanders, having in the island gold and silver mines, so that from the tenth of the money accruing from thence a treasure is laid up at Delphi equal to the richest, and they used every year to divide the riches that accrued from the mines. When, therefore, they established this treasure, they consulted the Oracle whether their present prosperity should continue with them for a long time, but the Pythian answered as follows: "When the prytaneum in Siphnos shall be white, and the market white-fronted, then there is need of a prudent man to guard against a wooden troop and a crimson herald." The market and prytaneum of the Siphnians were then adorned with Parian marble. This response they were unable to comprehend, either then on the moment, or when the Samians arrived. For as soon as the Samians reached Siphnos, they sent one of their ships conveying Ambassadors to the city. Formerly all ships were painted red, and this it was that the Pythian forewarned the Siphnians, bidding them beware of a wooden troop and a crimson herald. These Ambassadors then having arrived, requested the Siphnians to lend them ten talents; but when the Siphnians refused the loan, the Samians ravaged their territory; but the Siphinans having heard of it, came out to protect their property, and, having engaged, were beaten, and many of them were cut off from the city by the Samians, and they afterwards exacted from them a hundred talents" (Herodotus, "Thalia" 3, pars 57-58, pp. 194-195).

We cannot, however, doubt that the mouldings and other parts were enriched with colour and painted ornament; scorings for the painted ornament have been found on the marble, and traces of the colours; though no one can prove to demonstration that these were contemporary with the best times: and I have no doubt myself that the buildings were painted in glowing colours; we have, however, two or three circumstantial proofs. We know that the Egyptians, the Persians, and the Pompeians in Magna Grecia painted their buildings, and we know, in the best age, the Greeks painted their statues.

In the "Republic" (Lib. 4, par. 420, Jowett's Trans., vol. iii., page 297) Plato makes Socrates say: "If we were painting a statue, and some one were to come and blame us for not putting the most beautiful colours on the most beautiful parts of the body; for the eyes, he would say, ought to be purple, but they are black. In that case we might fairly answer, 'Sir, do not imagine that we ought to beautify the eyes to such a degree that they are no longer eyes; but see whether by giving this and the other features their due, we make the whole beautiful.'"

Now Socrates is said to have been a sculptor, and before he turned philosopher was a first-rate one. Pausanius (in his "Attics," Lib. 1, cap. 22), says: "In the entrance to the citadel there is a statue of Mercury, whom they call Propylæus, and statues of the Graces, both which are said to have been made by Socrates, the son of Sophroniscus, who, according to the testimony of the Pythian Apollo, was the wisest of men."

Pausanius, too (Lib. 6, cap. 19), says: "The Megarenses also, who dwell near the Attic land, built a treasury, and dedicated in it images made of cedar and painted with gold, so as to resemble flowers." Besides this, we read of statue painters, and most of the little figures from Tanagra have been painted; but probably the most convincing fact of the purely architectural polychromy is the discovery of the painted terra-cotta cappings which formed the outside gutters, and those that were used as wall linings, which were found by the Duke de Luynes at Metapontum, in the Gulf of Taranto.

We have Vitruvius' account that triglyphs

were painted blue. When Messrs. Henzler and Daumet published the result of their researches in the "Mission Archéologique de Macédoine," in 1876, they tell us they found at Pydna, in Macedonia, on the Thermaic gulf, and close to Thessaly, a sepulchral chamber ornamented with a Doric façade, and they show that the triglyph and the mutules of it were painted blue, the guttæ white, and in the blue triglyph cap was a bead and reel ornament like that at the Parthenon, painted white too; a red tænia, and the upper mouldings ornamented with patterns in colour. Besides the piece of ornament seen by Mr. Watts, Mr. Pullan found traces of red and blue on the ornament of the Mausoleum, and so did Wood at the Artemision or Temple of Diana of the Ephesians. There seems little doubt that the gold, red, and blue, which Owen Jones found to be the usual gamut of the Saracens, was merely continued by them from the Classical remains they found, though its use may have been extended by them. Hittorff has given some charming restorations in polychromy in his "Ancient Sicily," as well as in his Temple of Æsculapius. I cannot help thinking that anyone, not colour blind, must be charmed with Hittorff's polychromy in his "Ancient Sicily," and would desire to see it on our buildings now, even if it had not the prestige of Greek art.

ORNAMENT IN ARCHITECTURE.

On the 6th inst., in the Hall of the Carpenters' Company, London Wall, a lecture was given by Professor Banister Fletcher on "Ornament," the lecture forming one of a series given under the auspices of the Company.

The lecturer introduced his subject by saying that it was always of practical value, as well as pleasing, to trace the origin of ornament, and he thought that they might safely say that it was derived from two sources—(1) geometrical forms, and (2) natural foliage, flowers, and other objects. Under the first category came the use of the forms of the net, the honeycomb, snowflakes, clouds, and waves, arrangements of dots and lines, continuing and dividing geometrical figures and artificial objects made by man, such as shavings. Under the second class came plants, with their foliage, buds, flowers, and fruit, and trees, the flora of nature; and the fauna, human and animal forms and hair, and, derived from them, monstrous forms, such as the sphinx, the centaur, and the mermaid; human and animal bodies with plant-like terminations, and so on. Of the two classes, the geometrical might be taken as the earlier. Professor Meyer, of the School of Applied Art at Karlsruhe, considered geometrical ornament the oldest element of decoration, and pointed out that the implements of savages and the tattooing of Indians proved this. The seam, with its thread running back and forward, might have given rise to the zigzag, woven work suggesting reticulated patterns, and plaited hair the ornament of the plaited band. The lecturer showed in illustration implements used by Australian aborigines, and proceeded to deal with what he regarded as one of the most pleasing examples of geometrical ornament—the fret. He showed by diagrams how simply it was constructed, the band being divided horizontally into nine or thirteen alternate black and white spaces, and the vertical divisions being made according to a perfectly easy rule. Next came the bead, or astragal, of which he showed examples in Greek and Roman work, and which might be regarded as derived from a necklace of beads or from the knuckle-bones placed side by side. The bead and reel pattern might also be explained, with much probability, as derived from a simple arrangement of reversed and crossing semi-circles. After showing the varieties of charming ornament which took their rise from a simple arrangement of alternate black and white squares, and the use of the star or uraniscus, by which a panel could be effectively filled by an arrangement of radiating lines, as in a Greek coffer ceiling, of which he showed an example, the lecturer dealt with the apparently difficult band ornament known as the "guilloche," which was really simplicity itself, being readily formed by making a series of equidistant circles with diagonal lines rounded off. It might not improbably have been suggested by a piece of twisted wool. He next showed an Egyptian ornament, in which the ground was formed by a conventional treatment of the wave, upon which appeared a lotus leaf with a bud on each side—a most effective black and white design. A series of pavements were then shown, from Pompeii and elsewhere, exhibiting the varied effects to be obtained from arrangements of coloured bricks of various geometrical forms. In this connexion he showed a modern pavement as an example of what to avoid—a design in black and white, suggesting cubes standing out in high relief. Such a design could be of no use unless perhaps to teach a horse to lift its feet. The object of design in a pavement should, of course, be to give the impression of flatness, however elaborate the design. For examples of how geometrical design could be made to cover an entire wall space they must go to Moorish work. He showed the detail of the wall of a bay in the Alhambra Palace and other parts of the building, with an enormous amount of geometrical work and marvellous decorative effect. A vast amount of time must have been spent on this work, but architecture was not for to-day, but for all time, and was worth the best that could be given. In those days, too, labour was cheap and strikes unknown.

Still dealing with geometrical design, the lecturer went on to show various examples of Gothic windows with their magnificent tracery, beginning with the simpler forms of the Early English and proceeding to the Decorated period. He thought they would agree that geometry was grandly illustrated in the windows of that period. The tracery was absolute ornament, the whole could be removed leaving the arch bare, but although the supporting structure would remain, how poor would be the result. In the Perpendicular style they had the decadence of Gothic. The vertical and horizontal lines began to predominate over the charming features of the earlier work.

Coming again to what was to be avoided in ornament, the lecturer gave an example of spiral ribbon enrichments from the walls of the Louvre, which presented the same faults as he had noticed earlier in a pavement. The ribbon, although clever and charming in design, appeared to come out towards the spectator. That was false ornament. Ornament on a flat surface should never seek to imitate a moulding in relief.

Passing next to the second class of ornaments, those derived from natural objects, the lecturer emphasised the principle that in no case was nature to be "copied," though from nature were taken the ideas forming the basis of design. He showed a representation of the natural papyrus plant, side by side with the conventional treatment of the subject in stone in ancient Egypt and elsewhere. The beautiful bell-like shape was preserved, but the whole character of the plant was altered to suit the material the architect had to use. Among the examples were the pillar of Beni Hassan, one from the "Hall of Columns" at Karnac, of the date of 1322 B.C., showing the treatment of the papyrus bud, and a coloured example, 1311 B.C., Memnonium.

One of the simplest forms of natural ornament was the leaf and tongue, of which he showed examples in Greek and Roman mouldings. The lecturer then dealt with the acanthus plant, which, although without symbolic meaning, had been more used than any other plant in architecture of many and widespread styles. He showed cartoons of the natural plant; its use in the Greek capital, marked by the sharpness of the leaf-tips; the blunt rounded tips of the leaves in Roman work; the Byzantine, with its rough and massive treatment, contrasting with the delicate Greek work; the Romanesque and Early English. Every style of historic architecture had used the acanthus, and as time went on the forms became more and more conventional till hardly any trace of the natural leaf remained.

Reverting to the earlier use of the acanthus, he specially dealt with the more complex use of the plant in the Greek scroll. In an example shown from a building in Athens they would see that the original plant was positively lost, but the result was as grand and bold a bit of work as could be wished for. In a Roman example they had bold outline, rich in character: but nothing of the natural plant remained. It was a purely artistic invention, and most successful. Finally, he showed a knocker of the Adam period based on the acanthus, in which the plant not only formed the knocker, but was used as a coronet over the woman's head above. The Adam period, of course, was to some extent a revival of the Greek.

The lecturer went on to give examples of the use of the vine, honeysuckle, and other plants in architecture, and went on to ask the question, "Was the architect wise in varying natural objects, or should he, like the painter, be content with copying?" He fancied, from the examples he had given to his audience, that the ornament of the past, with its conventional treatment, was best, and the reason was not far to seek. Nature did not make her foliage, fruit, and flowers in stone, nor did she place her delicate buds isolated and at great heights. The architect had to do this, and to make his stone or brick building his background, to which his ornament must to some extent assimilate. Nature had a far different background—green hills, flowing streams, objects instinct with life, swaying and bending to the wind. Nothing of this could be copied in stone, which was for ever fixed part of the building, and only to be viewed in conjunction with it. If the architecture of the building were bold and masculine surely the ornament should be the same. How incongruous it would be to carve the daisy or the violet on the frieze of such a building. He laid stress on this because there was a school arising whose theory was that the natural treatment of ornament was the true one, and because ornament must play a most important part in any new style of architecture. Mr. Owen Jones, whose whole life was devoted to ornament and design, had laid it down as an axiom that the recurrence to a natural type was a degradation of design, and that great writer on architecture, Fergusson, said, "While confining himself to purely lithic forms, an architect can never sin against good taste, though he may miss many beauties. With natural forms used in ornament he is always in danger of offence, and few have ever employed them without falling into mistakes; in the first place because it is impossible to imitate perfectly foliage and flowers in stone, and secondly, because if the pliant forms of plants are made to support or do the work of hard stone, the incongruity is immediately apparent; and the more perfect the imitation the greater the mistake." The author of "Nature in Ornament" said that the reproduction must be more or less conventional, or it would not be ornamental.

Leaving the question to his audience, the lecturer went on to show a number of selected examples of the use of ornament in various styles, and pointed out that ornament should be confined to the decoration of the constructive parts of the fabric; and while it should not be used in too great profusion, a paucity of ornament betokened unpleasing poverty. Without ornament there was no architecture—only building. He gave a striking example of this by showing cartoons of the Palace of the Foscari, in Venice, and of the Greenwich Hospital, first as they are and then denuded of ornament; substantially the same structures, but exactly as a practical builder might put them up.

After showing some famous buildings by means of the lantern, the lecturer quoted in conclusion the words of a German professor, Herr von Tschudi of Berlin, to show that there was still hope of architecture, of which so many had desponded. The professor wrote: "In England the continuity of the development of taste in art had never been interrupted. The organic growth of art and of artistic handicrafts had been undisturbed, hence the present overwhelming influence of England upon the development of continental art."

A cordial vote of thanks to the lecturer was passed at the close.

BUILDING AN UNDERGROUND RAILWAY.

On Monday Mr. Basil Mott lectured at Carpenters' Hall, London Wall, on "Building an Underground Railway." He began by giving figures showing the enormous growth of the passenger traffic of London, by which the principal thoroughfares had been reduced to a state of congestion approaching a block. The enormous cost of making an underground railway of the ordinary type, which in the central part of the Metropolitan Railway reached 2,000,000*l.* a mile, and the impossibility of adding to the omnibus service, made some new means of transit imperative. Overhead lines of the New York type would never be tolerated in London, and the best solution of the problem hitherto found was the deep-level underground line, to the possibilities of

which the late Mr. J. H. Greathead drew attention. A successful example was the City and South London Railway, constructed under Mr. Greathead's own supervision.

The Central London Railway, now nearing completion, was in a unique position. Following the line of thoroughfares from Shepherd's Bush to the Mansion House, it occupied the most crowded route in the world, and it was impossible to estimate the traffic it would carry, which must be enormous. The deep level system avoided altogether the complex task of diverting the intricate maze of pipes, tubes, and wires that lay beneath the surface of the streets of a great city.

The line consisted of two separate tunnels, for the up and down traffic, fifty to a hundred feet below the street, and with larger tunnels for the stations, access to which was gained by lifts and stairways. Instead of brickwork, the unnels were made entirely of iron.

The first thing to be done after deciding on the route and obtaining powers, was to purchase the sites for the stations, as from these points the whole of the work had to be carried out. The surface of the streets must not be disturbed. On securing a site adjoining the street a shaft had to be sunk and a small tunnel driven out under the roadway before the actual station could be commenced. The shafts, like the tunnels, were of iron, in rings, the segments of which were bolted together, thus preventing any possible shifting of the ground. The site having been cleared, a ring of segments, each 6 ft. by 4 ft. was put down, and then the earth was dug away under the segments one by one, and new segments were bolted in underneath until a second ring was complete. The perpendicular surface of the earth round the shaft was thus never exposed for more than the space of two or three segments at a time. Thus the rings were put in one beneath another as the shaft deepened.

As the work of constructing the shaft went on, machinery had to be put in for removing the earth. This was done by a colliery cage of the ordinary type, with travelling cranes for loading and unloading the soil removed and the materials put in. The shaft having been completed and the bottom covered by a thick bed of concrete, a small tunnel 8 ft. in diameter was driven under the street, and here a chamber was made for the shield, which was the most important element in the tunnelling work.

The shield might be compared to the cap of a telescope, fitting over the iron tunnel as the cap fitted over the instrument. It consisted of a steel cylinder about 7 ft. in length, the front of which was a steel ring or cutting edge to cut into the clay. Behind that edge was a strong bulkhead or diaphragm, to stiffen the cylinder. Through the diaphragm was an opening or door about 5 ft. square, which could be entirely closed to prevent an inrush of water into the tunnel behind. Behind the bulkhead, and going right round, was a series of hydraulic rams, working against the steel rings of the tunnel, which were built within the tail or back part of the shield. Two or three rings having been built, miners went through the opening in the bulkhead and drove a heading or small tunnel ahead of the shield. Then the rams were brought into play, and forced the shield forward from off the rings. The cutting edge pierced into the clay, and the part to be removed fell into the space which had been made in front.

When the shield had been forced forward 1 ft. 8 in. the rams were withdrawn from the ring, another ring was put in under cover of the tail of the shield, the heading in front was driven further, and the shield was ready to be forced forward again.

As the shield advanced and left the iron rings of the tunnel uncovered, a narrow space was left all round between the tunnel and the clay by the withdrawal of the skin or cylindrical tail of the shield. This was filled in a very simple way, by a most effective machine, called a grouting apparatus. Lime or cement was forced through small holes left in the rings of the tunnel for the purpose, and ran completely round the tunnel, filling up the space left by the shield, so that any possible movement of the ground was prevented. The grouting apparatus was a strong iron tank, with an inlet pipe at the top by which compressed air was driven in by hydraulic power, and an outlet pipe at the bottom, communicating with the holes in the tunnel, through which the cement was forced. A spindle ran through the tank, with a pair of revolving arms to keep the cement stirred.

So effectual was this grouting, that on removing a small portion of a tunnel made in this way they did not find any case where the grouting had failed to fill up the finest hair crack. In some places the grouting had been forced 3 ft. or 4 ft. back from the iron segment.

In this way the tunnel was built up ring by ring, each ring being built up inside and under the protective cover of the shield. Very rapid progress was made, the average being 12 ft. or 14 ft. at each shield for the twenty-four hours. At every station site the same programme was followed, tunnels being driven in each direction to connect with those from the neighbouring stations. On the Central London they had as many as thirty shields at work at once, and had completed 500 yards in one week—a record in the history of tunnelling.

As these tunnels followed the line of the streets, when one tunnel was being driven to meet another, and the shafts or starting points were at the sides and not in a direct line, great care had to be taken in the alignment to see that the tunnels went in the right direction, and did not wander away under the houses. This required very accurate instruments. The practice was to set out on the street above the centre line of the tunnel, and then to follow the centre line underground. By means of the theodolite, the angles were accurately measured, and two thin wires were then hung down as far apart as possible to form the base lines for the angles. With a good instrument carefully used the results were very satisfactory. After three-quarters of a mile of tunnelling the tunnels had arrived at their destination without having deviated more than $1\frac{3}{4}$ in. In several cases the error was so small that it could be disregarded, and they might say that the tunnels met actually on the centre line. It was always a moment of anxiety when tunnels driven from a distance were about to meet. When the shields met they were removed, and the cast-iron rings joined together.

When the comparatively small main line tunnels had been fairly started, the large tunnels for the stations had to be made. They were made in precisely the same way, with larger shields. But as the diameter of these tunnels was 21 ft., of course the cast iron segments forming the tunnel had to be stronger and heavier. Where the streets were not of sufficient width to allow the two station tunnels for the up and down line to lie side by side, as at the Post Office, Chancery-lane, and Notting Hill Gate stations, the tunnels were made to lie one over the other. Even with these two large tunnels one over the other the work had been done so successfully that no movement of the ground or damage to property had been caused. The small tunnels had been carried under the entire length of Holborn Viaduct with its numerous piers, without any damage whatever.

After describing the large "cross-over" tunnels of 25 ft. diameter, made here and there to connect the up and down lines, the staircases and lifts at the stations, and the guiding of the shield in tunnelling, which was regulated easily, either to the right or left or up and down by varying the pressure on the hydraulic rams, the lecturer described the construction of the great terminal station occupying the space underneath the whole of the broad thoroughfare in front of the Bank and the Royal Exchange.

This had to be made without stopping the traffic overhead for a single day. Immediately under the horse's hoof was the central booking hall, round which ran a series of subways made for the convenience of the public, by which foot-passengers could get, say, from Cheapside to Lombard-street without crossing the street. Under these subways was a second series of subways, for gas and water pipes, telegraphic and other wires, pneumatic tubes, &c. Not one of the pipes could be removed till the new ones were in position and ready to be connected up. As the ground was excavated all the vast network of pipes had to be supported in the air in their original position until they could be taken away one by one as the pipes in the subway replaced them. The roofing in with steel troughing of the booking hall was a very delicate task, as the traffic could not be interrupted, but this was now nearly complete; the steel being covered with planks until the whole space was ready to be handed over to the Corporation to be asphalted.

While the booking-hall and subways were immediately below the traffic in the street, the two station platforms were below the booking-hall, and lower still were the tunnels of the City and South London Railway, which was now being extended to Moorgate-street, and would be running there in a few months. There was no reason why another railway lower still should not be made if necessary. Few people who passed the Mansion House had any idea of the enormous series of works, one below another, which had thus been constructed under this busiest thoroughfare in the world, without the slightest interference with the public convenience or with the heavy vehicular traffic on the surface.

THE LONDON AND PROVINCIAL BUILDERS' FOREMEN'S ASSOCIATION:

ANNUAL DINNER.

THE annual dinner of this Association was held on Saturday evening last at Anderton's Hotel, Fleet-street, E.C. Mr. Charles J. Elphick presided, and among those present were Messrs. Collinson, Treasure, W. N. Knowles (President of the Association), F. Ruddle, Wimpey, Carmichael, Butler, Wilson Mills, Todd, Grover, Bloore, Stirling, Courtney Lawrence, Winter, Woodward, and Croggon.

After the toast of the "Queen and Royal Family" had been honoured, the Chairman gave the "Navy, Army, and Reserve Forces," which was responded to by Mr. Treasure.

Mr. W. Young next submitted "The Architects and Builders." He observed that builders' foremen had lately come to occupy a very prominent position. One thing had struck him during the past few weeks—that was, that the foremen had not been allowed to establish their own identity and have a voice in the settlement of questions pertaining to their own existence. From his own standpoint it seemed as though the builder's foreman must, if the machinery was to run smoothly, be a friend of all and the enemy of none connected with the trade. Certain it was there were none who came before him in his desire to see the architect's designs successfully executed, even to the smallest detail, and there were none other next to the architect who looked with greater pride upon a finished piece of work, well carried out, than the responsible foreman. It was with the view that builders should have as foremen men in whom they could place implicit confidence that the Association was formed, and in their collective capacity they would like to be consulted in issues that arose between masters and men. They were looking forward to the time when they would receive sympathy from both master and man, and when all three would realise what was essentially true—that the interests of each were equally the interests of all. To this end he proposed "The Architects and Builders."

Mr. Collinson, who responded for the architects, said he was pleased to see the builders' foremen clubbing together and working as a body. They were undoubtedly the backbone of the building trade. He recognised that no branch of the trade desired good work more than the builders' foremen.

Mr. Treasure, for the builders, said he felt sure that if the builders' foremen only held together with the contractors who enjoyed the support of the architects and surveyors, the masters would get the best of the men in the present conflict with the plasterers. The pressing difficulty with the men was not on account of trade unionism, but the abuse of trade unionism. If they only showed that they had sufficient backbone on this occasion to stand out against this abuse, and press all their points upon their men, they would secure a victory which would be lasting in its results.

The Chairman proceeded to propose "The London and Provincial Builders' Foremen's Association." He remarked that builders' foremen had to know a little of everything, and a great deal of some things. The moment the foreman went on a job he was in charge of the details of work, and had to carry them out so that the job paid. He saw great possibilities in the Association. In his own case, when he wanted the services of a foreman, he knew were to obtain them. Touching upon the crisis with the plasterers, the Chairman pointed out that it was not the principle of trade-unionism that they objected to. In fact, he should like to see the builders' foremen banded together in a union of their own, rather than join the other kindred unions, which numbered forty or more. He did not see how they could be loyal to their employers when allied to the other unions. In the present crisis he hoped

the plasterers would realise the folly of trying to dictate to the employers.

Mr. W. N. Knowles, the President of the Association, responded. They had, he said, been in existence more than five years, and included on their roll foremen of character and ability in all sections of the building, engineering, and kindred trades. Their objects were educational first, and it necessarily followed that they endeavoured to raise the standard and preserve the integrity of their members. Besides that they rendered assistance to members in procuring engagements, and in the time of adversity. For the latter purpose they had a small contingent fund. At their meetings they had papers read by members on economic and technical questions. In fact, they sought to work on such lines as to earn the confidence of employers and employed alike.

"The Press" (proposed by Mr. G. Barclay), "The Visitors" (proposed by Mr. Webster, and acknowledged by Mr. Ruddl), and "Success to the Building Trade" (responded to by the Chairman) were the concluding toasts.

METROPOLITAN ASYLUMS BOARD.

AT the fortnightly meeting of the managers of the Metropolitan Asylums District, held on Saturday at the County Hall, Spring-gardens, Sir Edward Galsworthy presided.

Costly Sanitary Work. — The Leavesden Asylum Committee have long had under consideration the question of modernising the sanitary arrangements of the institution, which was built nearly thirty years ago. They now reported that an estimate by Messrs. A. & C. Harston, the architects, showed that the cost of the necessary sanitary annexes would be something like 20,000*l.* The Committee therefore recommended, and it was agreed, that the whole question should be deferred for consideration by the new Central Asylums Committee which is about to be constituted.

The Brook Hospital.—It was resolved to reply to the Local Government Board's criticisms in the terms of the report of the Works Committee already published.

Agreements with Architects.—The Works Committee submitted a further report suggesting changes in the system of the Managers with regard to building contracts arising out of the Brook Hospital Committee. They recommended that in future every architect employed should as a general rule be engaged under an agreement sealed by the Board. They submitted a draft form of agreement with architects, to form the basis of the individual agreements to be settled in each separate case by the solicitors. The draft agreement provided for the preparation by the architect of (1) sketch plans, estimates, and reports; (2) detailed plans for the approval of the Local Government Board; and (3) working drawings, specifications and the documents necessary for obtaining tenders, and to enable the contractor to carry out the work. All such plans and documents were to be the property of the managers, who should be at liberty to abandon the scheme and pay the architect an agreed sum. The architect was to agree to superintend the works, acting under the direction of and strictly obeying the orders of the managers and the committee. He should not allow any deviation or extra exceeding £25 in value to be commenced without the approval of the committee signified by the signature of the clerk of the managers. The architect should have custody of the plans, give certificates to contractors only in respect of works done to his entire satisfaction, and attend committee meetings on twenty-four hours' notice. The agreement provided for an inclusive payment, and might be determined without notice in case of incompetency or misconduct on the part of the architect. No rules of the Royal Institute of British Architects or any other Society should be held binding upon the Managers, and the agreement contained an arbitration clause under the Act of 1889. — Mr. A. C. Scovell, Chairman of the Committee, in moving the adoption of the report, said it was undoubtedly the most businesslike plan to make a specific contract with each architect. —Mr. Lile objected to the report on the ground that the Board were considering the proposal to have their own architect.—The Chairman said the agreement did not affect the proposal to have their own architect. It would only apply to any cases in which they might decide in future to engage an outside professional man.—Mr. Edward White, L.C.C., said the agreement guarded against the preparation of elaborate designs before the original sketches had been approved.—Mr. W. M. Acworth asked if steps had been taken to ascertain that architects would not refuse to sign such conditions.—Mr. Scovell replied that the committee would have been more simple than he thought them if they had submitted the conditions to the Royal Institute of British Architects. The managers paid for the work, and it was their business to protect themselves and the ratepayers. He did not apprehend much difficulty with architects. If any point was raised by an architect they could deal with it when it arose.—The report was adopted. On the recommendation of the same committee the managers approved a series of regulations as to the qualifications, duties, and wages of clerks of works, and delegated the appointment of these officers to the committee.

Appointments. — Mr. Hilton Johnson was appointed, out of 268 applicants, as Assistant Engineer to the Board. Mr. W. T. Farthing, of 46, Strand, was appointed to take out quantities of the buildings for the electric light installation at the Northern Hospital. Messrs. Fowler & Hugman, 9, Craig's-court, Charing Cross, were appointed to take out quantities of the buildings for the new heating system at the South Eastern Hospital, estimated at 5,396*l.* The plans of Messrs. A. & C. Harston, architects for the new laundry at the North Eastern Hospital, estimated at 14,450*l.*, were approved and adopted.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday, in the County Hall, Spring-gardens, Mr. T. McKinnon Wood, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee it was agreed to lend the Fulham Vestry 12,505*l.* for paving and other works, the Newington Vestry 10,000*l.* for electric lighting works, the St. George's-in-the-East Vestry 7,770*l.* for alterations to the Vestry Hall, and the School Board for London 200,000*l.* for purposes of the Elementary Education Acts.

Greenwich Tunnel.—The Bridges Committee stated that in July last they reported to the Council on the tenders that had been received on March 22, 1898, from Messrs. Mowlem & Co., 119,732*l.*, and Messrs. S. Pearson & Son, Limited, 155,000*l.*, for constructing the Greenwich footway tunnel. These tenders were received in reply to invitations addressed to certain selected firms. The revised estimate of the Engineer was 83,175*l.*, the original being 65,000*l.*, and the Committee advised the Council to allow the Engineer to carry out the work at a cost of 100,000*l.*, which was to include the estimated loss on the necessary plant. The Council referred the matter back. The Committee then advertised for tenders, with the following result:—Messrs. John Cochrane & Sons, 101,800*l.*; Mr. Thomas Taylor, 131,033*l.* 16s. 7d.; Messrs. Mowlem & Co., 135,330*l.* 7s. 4d.; Messrs. Pethick Brothers, 143,570*l.* 16s. 2d. Since the tenders were received Messrs. Cochrane have pointed out that they made an error of 7,700*l.* in their tender in respect of general charges for work under compressed air. The Engineer was of opinion that Messrs. Cochrane were correct in their statement, and the Committee considered that the amount should be added to their tender. This was 10,232*l.* below the lowest tender received in March, 1898, and only 9,500*l.* above the sum at which the Committee recommended last year that the Council should carry out the work. The Engineer, however, owing to the large increase in cost due to labour and materials, varying from 15 to 20 per cent., stated that his former estimate would have to be considerably increased were it brought up to date. Messrs. Cochrane & Sons desire that a similar arbitration clause to that which was accepted by Messrs. Pearson & Sons in the Blackwall Tunnel contract shall be included in their contract. To this the Committee agreed, and recommended that the supplemental estimate of 44,500*l.* submitted by the Finance Committee be approved, and that the amended tender of Messrs. Cochrane & Sons, amounting to 109,500*l.*, for the construction of the Greenwich footway tunnel, be accepted.

After a brief discussion the recommendation was agreed to.

Tower Bridge Northern Approach: Mansell-street.—The Improvements Committee recommended, and it was agreed, that the estimate of 2,675*l.* 4s. submitted by the Finance Committee be approved, and that, subject to the City Corporation agreeing to contribute one-half of the net cost of widening the whole of the portion of Mansell-street within the City boundary, in the event of that work being undertaken from time to time as opportunity occurs, the Improvements Committee be authorised to take all necessary steps for the widening of Mansell-street to 50 ft. at Nos. 21 to 29 (odd numbers).

Trinity-road Bridge, Wandsworth.—It was also agreed that sanction be given to the expenditure of 2,993*l.* 15s. 3d. in excess of the estimate approved by the Council for the widening by the London and South-Western Railway Company of the bridge and approaches carrying Trinity-road, Wandsworth, over the railway.

Parliament-street and Charles-street.—It was agreed that a payment of 2,250*l.* be made to H.M. Office of Works on account of the Council's promised contribution in respect of the making-up of Parliament-street and Charles-street.

The Housing Question.—Dr. Cooper moved, and Mr. Crookes seconded—"That Standing Order No. 315, relating to the dwellings for the working classes, be amended by the omission of the following words from clause 2 (*a*)—'and shall be so fixed that, after providing for all outgoings, interest, and sinking fund charges, there shall be no charge on the county rate in respect of the dwellings on such area or scheme, and that all such dwellings shall be so designed that the cost of erection may not exceed a sum which will enable the Council to carry out the foregoing conditions.'"

Mr. Campbell moved, as an amendment, that the proposal should go to the General Purposes Committee.

Mr. R. C. Phillimore seconded.

Dr. Cooper accepted the amendment, which was agreed to.

Mr. Beachcroft then moved to add that the Finance Committee should also consider the question.

Mr. Corbett seconded, and after a short discussion the amendment was rejected. The motion, as amended, was then agreed to, with a further instruction that the committee were to consider whether the Standing order should be amended in any other respect.

On the motion of Mr. Glanville the following was agreed to:—"That it be an instruction to the Housing of the Working Classes Committee to ascertain and report at the earliest opportunity the cost of acquiring from 30 to 50 acres of land not previously built upon, and the cost of erecting thereon small dwellings for two families, such parts of dwellings to be let at a rental of not less than five shillings nor more than ten shillings weekly, including all rates and taxes, and not more than twenty nor less than fifteen houses to be built upon each acre after allowing for the usual 40-foot roadway; and further, the annual amount per house required in order to repay the cost of the land and buildings within a period of 100 years."

Means of Escape from Fire.—Mr. Westacott moved, and it was agreed, that in the opinion of the Council it is desirable that provision for a proper and easy access should be made to the roofs of all new and altered buildings within the County of London, for use not only in cases of fire, but for all general purposes, and that it be referred to the Building Act Committee to advise the Council the best way of accomplishing this object.

The Price of Gas.—Mr. Westacott also moved, and Mr. Nathan Robinson seconded, a motion urging the Board of Trade to hold an inquiry into the present management and working of the Gas Light and Coke Company, with a view to ascertaining whether there was any reason for the difference in the price of gas in North and South London, and whether measures could be taken to secure a uniform charge for gas supplied in London.

The motion was adopted.

Relieving Strand Traffic. — Mr. Howell Williams moved:—"That with a view of relieving the extreme pressure of traffic in the Strand, the Improvements and Bridges Committees be instructed to consider and report as to the desirability and possibility of constructing an approach from Waterloo-bridge on to the Victoria-embankment, so that traffic requiring to proceed eastward or westward may do so without entering the Strand."

Colonel Ford seconded the motion.

Mr. Ward, Chairman of the Bridges Committee, said there were great practical difficulties in the way of the scheme.

Mr. Lawson said it would greatly disfigure and damage the only good thoroughfare that London possessed.

Dr. Longstaff said he desired to oppose the motion on behalf of the Improvements Committee. The Council's officers were so full of work that it would be positive cruelty to put more work upon them at present.

Mr. Westacott moved "That the Council do proceed to the next business," which was seconded by Mr. N. Robinson and carried.

Chaucer and Milton Memorials.—On the motion of Mr. Parker, it was agreed that, as London possesses no adequate memorial of two of her greatest citizens, Geoffrey Chaucer and John Milton, and as the year 1900 will be the fifth centennial of the former's death, an exceptional opportunity will arise for marking Londoners' sense of the honour due to men whose reputations are world-wide as well as metropolitan, and that, therefore, it be referred to the General Purposes and Improvements Committees to consider the desirablenesss of erecting (in the space to be reserved for refuges or ornamental enclosures) in that portion of the Strand which will be widened consequent upon the removal of the Holywell-street block of buildings, statues in honour of the memory of Geoffrey Chaucer and John Milton.

The Council adjourned shortly before seven o'clock.

THE CLERKS OF WORKS' ASSOCIATION:

ANNUAL DINNER.

THE sixteenth annual dinner of the Clerks of Works' Association was held on Monday evening in the King's Hall, Holborn Restaurant. Mr. E. W. Mountford was to have presided, but, in his unavoidable absence, the chair was occupied by Mr. W. H. Seth-Smith, who was supported by Messrs. E. Flint, E. Woodthorpe, J. E. Drower, Howard Colls, — Boulnois, and others.

The usual loyal and patriotic toasts having been honoured (Mr. J. Aitchison responding for the "Navy, Army, and Reserve Forces"),

Mr. F. Dashwood, secretary, gave "The Architects and Surveyors." In the course of his remarks, he said he wished to ask the assistance of architects and surveyors in the endeavour of clerks of works to secure better remuneration. During the past thirty years the wages of mechanics and labourers had gone up 25 or 30 per cent., whereas the salaries of clerks of works had remained stationary. He was not making a demand; there was no trades unionism about their Association; but he thought that clerks of works could justly ask for better payment seeing how much their duties had increased in recent years. He thought that clerks of works ought to receive four guineas a week for jobs up to 50,000*l.*; five guineas for 100,000*l.*; six guineas when the work would cost from 100,000*l.* to 150,000*l.*, and a guinea a week for each 50,000*l.* in addition. That was not too much for a good, honest, straightforward clerk of works. In the present form of building contract, where the clerk was called a clerk of works, it was stated that he should represent the architect; that was as it should be. But in the proposed form the clerk of works was referred to as an inspector, "who had power to inspect and report"; that was as it should not be. They wanted to retain the old and honourable title of clerk of works, and be an adjunct to the great profession of architecture.

Mr. H. V. Lanchester, in responding for the architects, said he felt that the position of inspector on a building was not derogatory to a clerk of works. There were serious difficulties to be faced by the clerk of works when he was the representative of the architect, as he (the speaker) knew when he once acted in that capacity. As to the clerk of work's salary being proportionate to the cost of the building, he could not agree with that at all. The salary should be proportionate to the ability of the clerk of works. Men were not all alike in heir abilities, and they had to be paid accordngly. He cordially agreed, however, that the alaries of clerks of works were smaller than they should be.

Mr. J. E. Drower replied for the surveyors, and said that he had great admiration for English architects of the present day. In no other country had there been so much breaking away from architectural tradition—such an amount of originality and invention and such an intuition as to the needs of the day. There had been buildings erected during the last twenty-five years which for centuries would be a delight to look upon. If engineers would remember that they are only engineers and not architects, and would entrust some of their designs for bridges, warehouses, &c., to architects, the country could be covered with many more buildings of a monumental character which would beautify the land and delight the beholder. In all the originality he had referred to, architects had been helped by the practical knowledge and resourcefulness of clerks of works. A clerk of works should be, and generally was, honourable, businesslike, tactful, and of great practical experience; much of this could be obtained by belonging to the Clerks of Works Association—an association of self-helping and self-reliant men, who united for self-improvement—an association which he could only compare with the Architectural Association, which had, perhaps, no equal in the world and performed a great educational work which in other countries would be undertaken by the State.

Mr. J. Brady, editor of the Clerks of Works' *Journal*, then proposed "The Worshipful Company of Carpenters." A few years ago the Company were almost alone in their efforts to get satisfactory practical work done in the various trades, but their work had grown. The Company provided a home for the Clerks of Works Association, and every year one of the members of the Association assisted in the Company's examinations.

Mr. H. Phillips Fletcher having briefly replied,

The Chairman gave the toast of the evening, "The Clerks of Works Association." In the course of his remarks he said, in referring to the question whether architects were artists or craftsmen, that every architect was an artist, and that no architect could be a craftsman. A partnership between the architect and the craftsman was exactly what was wanted, and the Clerks of Works Association was an excellent organisation to act in conjunction with architects. Considering the amount and the character of the work of clerks of works—their energy, skill, and watchfulness—he thought they should receive better pay. He could not wholly agree with Mr. Lanchester that the commission scale was not a reasonable one. Some such scale as that suggested by Mr. Dashwood would not be unreasonable.

With the toast was coupled the name of Mr. W. Baker, President, who replied. He said he was decidedly opposed to the clerk of works being known for the future as the "Inspector"; there was no reason for such a change.

Mr. J. Spooner, Vice-President, next gave the toast of the "Visitors," and Mr. Howard Colls, in response, said it did seem absurd that the clerk of works who was superintending a small work should receive, within a guinea or so, the same salary as the man who was superintending the erection of a palace costing some hundreds of thousands of pounds. Mr. Colls then briefly referred to labour troubles, and said that there was an idea among workmen that it was a fine thing for a man to do a third or half a day's work for a full day's pay, and so provide work for others. That was a gospel of idleness which was certain to end in disaster sooner or later. He hoped that this idea would pass away, and that workmen would feel that for a fair day's wage they should do a fair day's work. From all he heard, however, he was afraid that there was trouble ahead.

Other toasts were "The Press," proposed by Mr. E. Woodthorpe and responded to by our representative; "The Hon. Treasurer, Mr. John Oldrid Scott," proposed by Mr. Green and acknowledged by Mr. King; and "The Chairman," proposed by Mr. E. W. Nightingale.

CHUBB'S NEW WORKS AT WOLVERHAMPTON.—In addition to the large erection now in progress close to the high-level station, Wolverhampton, the directors of Chubb & Son's Lock and Safe Company, Limited, have this week decided to also build over the rest of the freehold land which they acquired recently from the Wolverhampton Corporation. The further additions will be of a substantial nature, affording accommodation for 100 more men, and when the whole of the new buildings at Wolverhampton are fully equipped, they will have cost the company between 15,000*l.* and 20,000*l.*

APPLICATIONS UNDER THE LONDON BUILDING ACT, 1894.

AT the meeting of the London County Council on Tuesday, the Building Act Committee brought up the following list of applications under the 1894 London Building Act. Those applications to which consent has been given are granted on certain conditions.*

Lines of Frontage.

Marylebone, East.—An open iron gangway across Berners-mews, to connect Nos. 1 and 3, Mortimer-street with Nos. 51 and 52, Newman-street, St. Marylebone (Mr. J. Slater, for Mr. E. Penton).—Consent.

Wandsworth.—Houses with shops on the western side of Streatham High-road, Streatham, between St. Leonard's Church and The Shrubbery (Mr. J. S. Quilter, for the Rev. Canon Nicholl).—Consent.

Lewisham.†—Buildings on the east side of Rushey Green and the north side of Sangley-road, Lewisham (Mr. J. Norton, for Mr. E. Mac. F. Patterson), —Refused.

Space at Rear.

Lewisham.—A stable at the rear of a house proposed to be erected on the east side of Bromley-road, Lewisham, adjoining The Gables, without an open space at the rear in accordance with Section 41 of the London Building Act, 1894.—Refused.

Buildings for the Supply of Electricity.

Battersea.—That the Council do approve of the amended plans, submitted with the further application of Mr. C. S. Peach, for the Vestry of Battersea, for the construction of a generating station and works on the east side of Lombard-road, at the corner of Holman-road, Battersea.—Agreed.

Southwark, West.—That the Council do approve of the plans submitted with the applications of Mr. F. Bailey, for the City of London Electric Lighting Company, Limited, for the construction of an engine-house and an additional story to a workshop at the company's electricity generating station, No. 64, Bankside, Southwark.—Agreed.

Southwark, West.—That the Council do approve of the plans submitted with the application of Mr. F. Bailey, for the City of London Electric Lighting Company, Limited, for the construction of an extension to a boiler-house at the company's electricity generating station, No. 65, Bankside, Southwark.—Agreed.

Means of Escape at Top of High Buildings.

Strand.—That Messrs. White & Co. be informed that the Council, in the exercise of its powers under Section 63 of the London Building Act, 1894, is not prepared to grant a certificate in respect of the means of escape in case of fire to be provided for the persons dwelling or employed on the topmost floor of a building proposed to be erected on the site of Nos. 173 to 179 (inclusive), Strand, and No. 2, Norfolk-street.—Agreed.

The recommendation marked † is contrary to the views of the Local Authorities.

THE DISPUTE IN THE LONDON BUILDING TRADE.

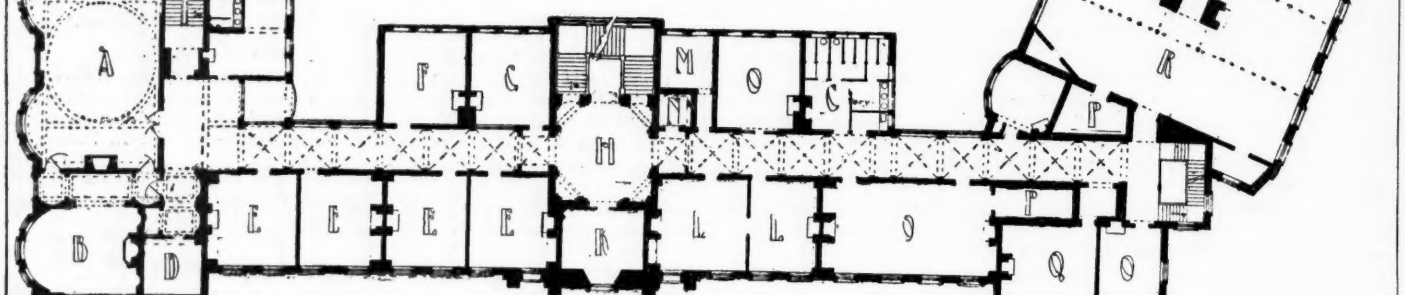
ALTHOUGH the officials of the Plasterers' Union refuse to make public the result of the ballot, it is understood that a large majority are opposed to forcing foremen plasterers into the union, and that, therefore, the resolution making it obligatory upon them to become members of the union will be withdrawn at the next meeting of the committee. On Monday, in consequence of the result of the ballot, a number of the men who struck work at the commencement of the dispute at the works of the Veronese Company, at Putney, returned to work. All of these men had been at work elsewhere, but as this company is considered, it is stated, to be one of the best shops in the trade, and as the real cause of the trouble had been removed, the men did not hesitate to at once resume work for their old employers.

BOOKS RECEIVED.

LAXTON'S BUILDERS' PRICE BOOK FOR 1899. (Simpkin, Marshall, & Co.)

PULPIT, ST. ANDREW'S, AVONMOUTH.—A new pulpit has been erected in Avonmouth Church. The pulpit is of Bath stone. Its panels contain three figures in relief, representing our Lord, St. Andrew, and St. Paul, and an inscription, "To the glory of God and in memory of His servant, David Wright, thirty-five years vicar." The pulpit is from the design of Mr. W. W. Bethell, of London, the architect of the church, and has been executed by Messrs. Hems, of Exeter.

* Names of applicants are given in brackets. Buildings are new erections unless otherwise stated.



New Railway Offices, York. Plan of First Floor.

A. Board Room.
B. Ante Room.
C. Lavatories.
D. Hats and Coats.
E. Committee Rooms.
F. Chairman.
G. Officers' Waiting Room.
H. Upper Hall and Main Staircase.
K. Messenger.
L. Secretary.
M. Cleaner.
N. Lift.
O. Offices.
P. Strong Rooms.
Q. Auditor.
R. Transfer and Debenture Offices.

Illustrations.

DESIGN FOR A CONCERT HALL.

THIS design, by Mr. W. Stanley Bates, was prepared in competition for the Soane medallion; and we give it as the one to which, in our opinion, the prize ought to have been awarded, because it shows the best knowledge, among the designs submitted, of the requirements of a concert hall.

The following is the author's own description of his intentions in the design :—

"One of the most important conditions was that the plans should conform to the regulations of the London County Council. In view of the fact of the Royal Institute of British Architects publishing some 'Suggestions for Competitions,' in which paragraph 9 states that if a design violate any of the conditions, that design shall be excluded from the competition, it was felt that all the conditions would be rigidly enforced. An attempt, therefore, was made to try and carry out the regulations of the London County Council.

The area and the first and second circles have numerous exits with doors opening outwards into fireproof corridors which lead to the exit staircases from the tiers and into the street from the area.

Gangways 3 ft. wide are provided in the rear and sides of all the seating.

Opening out of the fireproof corridors on the flanks of the building and out of the crush rooms in the front are six groups of balconies, each group looking directly into a street which would form additional elements of safety in case of fire.

All the staircases for the use of the public and the performers are fireproof and enclosed with 9 in. walls, with the exception of the two entrance staircases in the front.

The portion given up to royalty is kept perfectly private, and comprises royal entrance, staircases, two retiring rooms, and a royal box.

Two separate entrances are provided for the artistes and two for the band and chorus, the whole of the block devoted to the performers being divided from the rest of the building by a party wall.

As the sanitary arrangements of a building of this size become very important care was taken that all the offices were well lighted and ventilated, and separated from the retiring-rooms by passages. Inspection-chambers placed in the areas shown on the plans take the drainage of the several groups.

As regards the plan of the concert hall proper in connexion with its accoustic properties, the auditorium follows in shape that of the Queen's Hall in Langham-place, W., which is very successful in this respect, and the area floor was purposely kept level for promenade concerts.

It was felt also that the concert hall proper should rise above the general mass of the building, and the subsidiary parts carefully grouped round it so that the external appearance would explain, as far as possible, the arrangements within."

We will add one or two comments of our own. The exterior design has the merit of arising out of and expressing the arrangement of the building; at the same time it lacks dignity of style, and we cannot admire what may be called the "stumpy-column" manner. A concert hall is a building for festive purposes, and should have an architectural treatment more in accordance with that idea. In regard to practical matters, the curve of the orchestra and chorus seats would have been better of a wider and flatter segment; to bring the curve round so much makes the singers at the sides sing too much sideways and not sufficiently towards the audience.* The lower stages, for the band, should have been fewer in the given space and wider; about 3 ft. 2 in. wide is the best. The curve at the opposite end of the hall is liable to cause an echo towards the centre of the curve; the walls, both here and at the side, should be a little broken up with projections of some kind, and not left with a smooth surface. In regard to the end curve, however, the galleries, as shown on the section, would assist in obliterating echo. The corridors could only be lighted in the daytime by glass panels in the doors, and would be rather dark, though it must be admitted that this is a defect common to many concert halls and one which, where there are galleries, it is very difficult to avoid; and it is of less importance in a concert hall than in many other classes of buildings, in view of the fact that concert rooms are so much more often used by night than by day.

The arrangement of the rooms for principal performers at opposite sides of the orchestra—ladies on one side and gentlemen on the other—would not answer in practice; the "green-room" (to use the theatrical term) is common ground for solo artists of both sexes; and necessarily so, because where ladies and gentlemen are to take part together in the same piece (for instance, where a lady violinist leads a quartett in which the other players are men), they often have some arrangement to make together as to the performance—something to say at the last moment, and they must be together before going before the audience. Dressing rooms and lavatories are required for ladies and gentlemen in contiguity with the green-room, but the green-room itself is a kind of drawing-room common to all the performers.

In the main, however, this is a very clever design, and does credit to its author.

* The whole of the chorus seats, it should be added, are not shown on the ground plan, as the back rows come above its level.

PART OF NEW NORTH-EASTERN RAILWAY OFFICES, YORK.

THESE buildings, of which Mr. Horace Field is the architect, will occupy a site opposite to the old station at York, now used as railway offices.

The materials proposed to be used are Huddlestone stone, red Suffolk bricks and green Westmoreland slates. A plan of the first floor is given.

The perspective view was exhibited at last year's Royal Academy.

PROPOSED CHURCH AT BEDFORD.

THIS church is about to be built on the northern side of the town in a rapidly-developing district, where new church accommodation is greatly needed. It will replace the present iron structure, which is already far too small for the requirements.

The new church will be built of brick and stone, with grey stone slates for the roofs. A colour scheme is being prepared for the interior treatment.

The plan consists of nave and aisles, with the latter as ambulatories only. There will be a morning chapel on the south side, with an organ-loft and singing-gallery on the north side. A special feature of the interior will be the raised sanctuary (the floor of which will be 7 ft. above that of the nave), with the vestries and sacristy arranged below.

The total seating accommodation will be 750; and the cost, including the tower, will be about 5,000*l.*

The architects are Messrs. C. E. Mallows & Grocock, of Bedford and London.

The drawing from which the illustration is taken was exhibited in the Royal Academy of last year.

DESIGN FOR CEMETERY CHURCH ON A HILL.

THIS design, by Mr. E. F. Reynolds, was exhibited at the Royal Academy last year. The author writes :—

"The *motif* of the design was the architectural expression of special conditions imposed by the site, which was supposed to be at the summit of a hill. The tower is therefore grouped with the west gable, thus forming a mass with vertical lines emphasised, which buttresses up the more horizontal lines of the body of the church."

COMPETITIONS.

SCHOOL, DUFFTOWN, N.B.—At an adjourned meeting of the Mortlach School Board the consideration of three competitive plans for the new schools was resumed, and the Board agreed to accept the plans submitted by Mr. G. Sutherland, architect, Elgin, and appointed him to carry out the work. The probable cost is about 4,000*l.*

WESLEYAN CHAPEL, ANNFIELD PLAIN, DURHAM.—Mr. Geo. T. Wilson, architect, Blackhill, has secured the premium for the best design for the reconstruction of the Wesleyan Church at Annfield Plain in amphitheatre form, at an estimated outlay of about 2,000*l.* Messrs. Green & Brockbank, Liverpool, were adjudicated second; Mr. Thompson, Newcastle, third; and Mr. D. Spence, Shotley Bridge, fourth.

BANK, DOUGLAS, ISLE OF MAN.—A new bank is to be erected at Douglas for the Isle of Man Banking Company, Limited. It is to be built of Aberdeen granite at a cost of 13,000*l.* The new bank will occupy a site in Douglas similar to that of the Northern Assurance Company in Aberdeen, as it is to be built at the junction of the principal thoroughfares, Athol-street and Prospect Hill. On the ground floor the bank offices will be located, and the two upper floors will be let out as business offices. Mr. A. Marshall Mackenzie, A.R.S.A., Aberdeen, is the architect.

ARCHITECTURAL SOCIETIES.

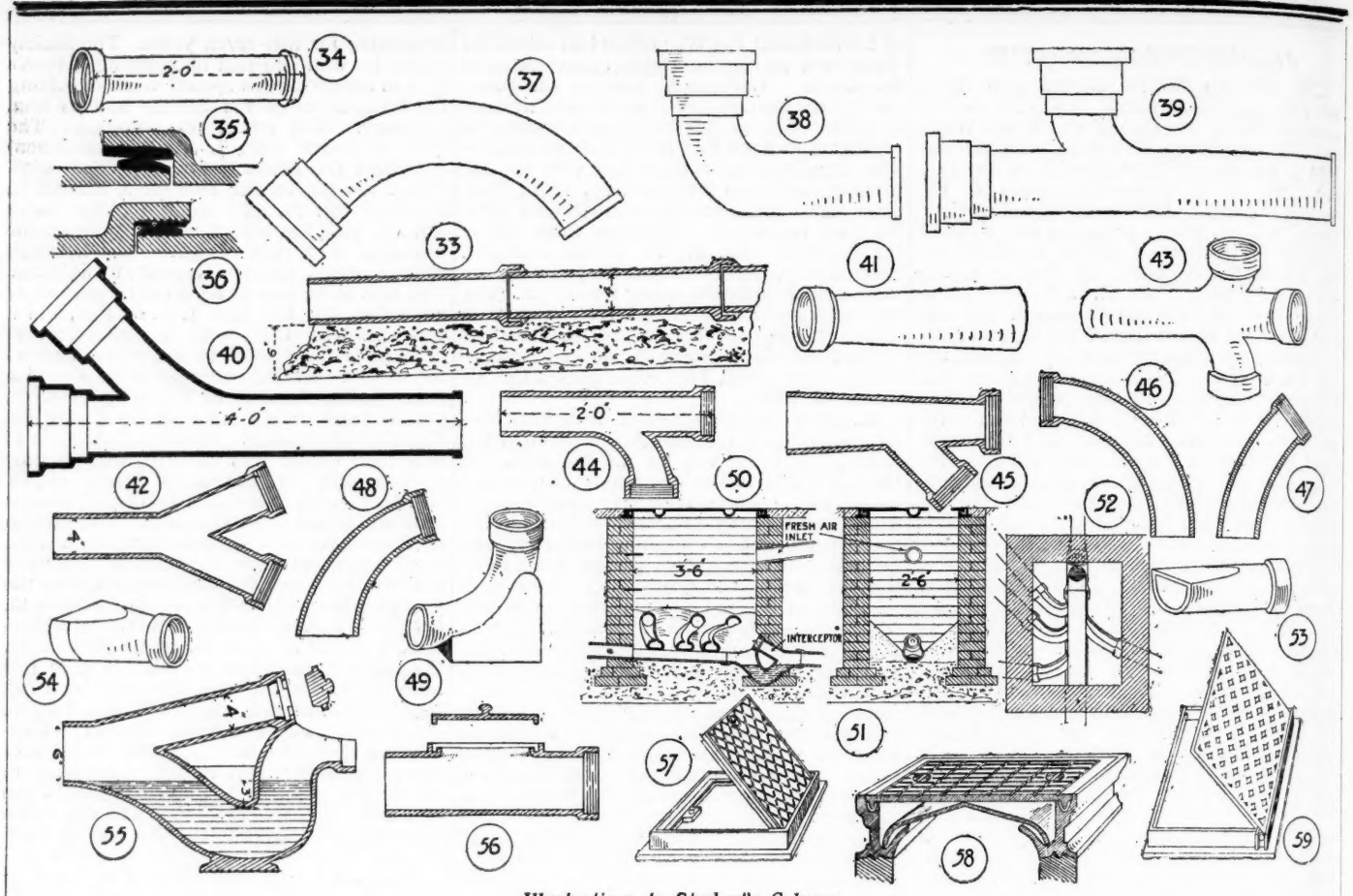
CARDIFF AND SOUTH WALES AND MONMOUTHSHIRE ARCHITECTS' SOCIETY. — The annual dinner of the Cardiff and South Wales and Monmouthshire Architects' Society was held at the Royal Hotel, Cardiff, on the 11th inst. Mr. C. B. Fowler, President of the Society, presided. After the loyal and patriotic toasts, Mr. W. Cooke proposed the toast of "The Royal Institute of British Architects and the Cardiff, South Wales, and Monmouthshire Architects' Society." Mr. H. L. Florence (vice-President of the Institute) responded. He had that afternoon visited Cardiff Castle, and there he saw the spirit of an artist who had produced the forms of the thirteenth century and had infused into them the life and spirit of the nineteenth. That should be the end and aim of the architect. They were about to erect new municipal buildings in Cardiff. He had seen the plans, and he was delighted to see how convenience and admirable arrangement in the interior had been blended with beauty and proportion in the exterior.—The President also responded, and expressed the opinion that young architects should, instead of settling down at once in the town, go about and get eight or ten years' experience in different parts of the country. In this way would local architecture be raised to the highest standard. In conclusion, the President spoke of the good work in connexion with the local society done by their indefatigable secretary, Mr. W. H. Dashwood Caple.—At this point the President moved a resolution of hearty congratulation to Mr. Goscombe John on the occasion of his achieving membership with the Royal Academy. It was an honour of which they all felt proud, for Mr. Goscombe John was a Cardiff boy. Mr. E. W. M. Corbett seconded, and the resolution was adopted with acclamation. Mr. J. Coates Carter (President-elect) proposed the Local Government bodies. The Deputy-Mayor (Alderman Trounce), the Mayor of Newport, and Mr. Lewis Williams responded. Other toasts were "The Master Builders" and "The Visitors." The front page of the menu card was designed by the President. The wording of the menu bore the heading, "Specification," and the courses were named "Setting Out," "Foundations," "Damp Course," "Joinery," "Walling," "Roof," "Certificates," "On Account," and "Final Certificate."

EDINBURGH ARCHITECTURAL ASSOCIATION. —At the meeting in the Royal Institution on the 8th inst.—Mr. Thomas Ross, President, in the chair—a paper was read by Mr. Thomas A. Croal entitled "Some Words about Edinburgh Architecture." Dealing with the placing of buildings and the exits from public places, Mr. Croal took for his starting point Mr. Waterhouse's comments on the site ultimately selected for the Usher Hall. Mr. Waterhouse had remarked, on the general question, that a site for a public building should be more or less surrounded by lawns and trees, as nothing, in his judgment, so much enhanced the enjoyment of fine architecture as the softening influence of neighbouring vegetation. Proceeding on the lines thus indicated, Mr. Croal reviewed the position of many public buildings in Edinburgh, first noting the beauty to the eye presented by the Register House, and suggesting that the reason for the determination of Edinburgh to preserve the north side of Charlotte-square lay in the charm of its combination of a sunny frontage and the "softening influence of neighbouring vegetation." Mr. Croal indicated the Scott Monument as a prominent illustration of a building badly placed, in respect that its worst aspect was on its own proper front. The University was so placed that the best front view was obtained inside, and the Museum of Science and Art had heavy cornices to keep off the sun, and an open glass front to the cold north. Fettes College was so grandly placed that the plainness of its rear view did not offend, but many buildings existed whose back parts, although on the sunny side, were so bald as to show only deformity. Princes-street although Glasgow folk called it "a street wi' ae side," seemed the perfection of condition for prominent town architecture. Referring to the fact announced by the Lord Provost that the new buildings in the Castle were condemned by the Commander-in-Chief and the War Secretary, Mr. Croal showed how they came as an ugly breach in what was formerly a lovely and perfect contour, and then commented on the curious fact stated at Dundee by the Marquis of Lothian, that the War Office had raised the question of carving the English quarterings on the Castle. The second part of the paper pointed out the dangers of exit from a number of public halls in Edinburgh, and counselled architects to keep this point well in mind.—The members made their first visit for the present session on the 11th inst., when Toll-cross cable-power station was thrown open for their inspection. Members were met at the depot by Mr. W. N. Colam and Mr. Cooper, the Engineers for the Corporation, and were conducted by them over the station. The company, having completed their inspection of the station, paid a short visit to the Edinburgh Industrial Brigade Home in Fountainbridge, over which they were shown by Mr. Frank W. Simon.

GLASGOW ARCHITECTURAL ASSOCIATION.—At a meeting of this Association, held in the rooms, 187, Pitt-street, on the 7th inst., Mr. George S. Hill in the chair, a paper was read by Mr. John Lochhead entitled "Shop Fronts." The essayist shortly described the shops of the seventeenth and eighteenth centuries, and quoted several enactments passed about those times regulating the projection of stall-board, resulting in the flat bow window, which was still a common feature of English shops. With the introduction of plate glass the necessity for numerous astragals had been done away with, and with the possibilities of having large windows in single sheets the desires of tenants had increased, and shops to please them must have the whole front practically one sheet of glass. It was almost always the desire of the tenant of a corner site to carry his windows unbroken round the corner, and this caused a great loss of appearance to the whole building, as all idea of strength at the corner was gone when the corner butt was dispensed with. The idea of recessing the shop front and carrying along a colonnade was good, as it afforded not only protection to the windows, but also to the public while examining the goods on view. The interesting series of shops called the "Row" at Chester was referred to, where the first floor was also devoted to shops, access being obtained by means of a gallery running along at that level. The essayist advocated that greater individuality should be given to shops occupied by tenants carrying on different trades, and showed by means of photographs and sketches the different treatment which could be accorded with pleasing effect to provision shops, public-houses, &c. In this connexion also a large number of drawings were shown illustrating the treatment which the upper portion of a shop window could have, either by dividing the pane by vertical or radiating astragals or by the uses of etched lines, &c., round the panes, as only a height of 7 ft. to 8 ft. was required for the show-case in the window. The treatment thus given did not detract from the showing of goods, while, at the same time, giving a most pleasing effect to the whole window. At the close of the paper the meeting accorded a vote of thanks to Mr. Lochhead.

THE ARCHITECTURAL ASSOCIATION OF IRELAND.—A meeting of this Association was held at the Grosvenor Hotel, Westland-row, on the 7th inst., the Vice-president, Mr. George Sheridan, in the chair. Mr. R. M. Butler, hon. sec., read a paper entitled "The Influence of Climate and Material on National Architecture." This paper was awarded the prize essay of the Association for 1897. The lecture was illustrated by lantern views, and the subject very fully dealt with. The lecturer showed that in all great periods of architecture the influences of climate and material had exercised a large influence over the art of building. That it was only when the art became corrupted and enervated, and when mere copyism was called design, that these principles ceased to govern design. Likewise the lecturer showed that the social conditions and requirements of the people had in all times exercised an immense influence on their buildings. A vote of thanks to the lecturer was passed unanimously.

EXETER DIOCESAN ARCHITECTURAL AND ARCHÆOLOGICAL SOCIETY.—On the 10th inst., the annual meeting of the Exeter Diocesan Architectural and Archæological Society was held at the College Hall, South-street, Exeter. The Rev. F. B. Dickinson presided. The annual report stated that the Society sustained a deep loss in 1898 by the lamented death of the senior hon. secretary (the late Rev. J. L. Fulford), who had acted in that capacity for forty-two years, and was a member of the committee for fifty-seven years. The Society might be congratulated on securing his son's help in the deceased's special work of editing the transactions of the Society and as hon. secretary. The report was adopted. The hon. treasurer (Mr. J. T. Browne-Mason) presented the accounts for 1897 and 1898. Those for the former showed a balance in hand of 87*l.* 7s. 4d.; those for the latter 45*l.* 19s. 10d., the reduction being due to the payment of a debt of 50*l.* The accounts were adopted. Officers, &c., were then elected. The Rev. R. Medley Fulford read a memoir of his father, the late Rev. J. L. Fulford, and it was resolved that, with a photograph of deceased, it be printed in the transactions of the society. Mr. Harbottle Reed then read a paper on the Churches of Boscastle, Trevalga, and Tintagel, which were visited during the 1897 district meeting. At Boscastle the site of Bottreaux Castle was situated, though now marked only by the steep grassy slopes Minster Church was visited, this being about a mile and a half from Boscastle. The church now consisted of a chancel, nave, south aisle, south porch, and western tower, and it appeared that William, son of Nicholas Botreaux, about the year 1200, founded a cell here of the Priory of St. Sergius of Anjou. According to Sir John Maclean, it ceased to exist in 1407. Proceeding, the lecturer stated that a credence table had been partly formed with two mutilated oak bench ends, in one of which a tonsured figure was kneeling before a book. These two fragments, it appeared, were the only remains of the carved oak which was once the glory of the sacred edifice. Mr. Reed regretted the spoliation of these old churches at the hands of unsympathetic restorers—he was inclined to call them destroyers. He was told that a great actor had been allowed to transport some old bench ends to a London stage. Passing on to Forrabury Church, the speaker described its situation, and, referring to the credence, said one had been made out of three bench ends rudely carved. Between Trevalga and Tintagel was situated St. Piran's Chapel, now used as a cattle shed. Close by is St. Piran's Well, covered by rude pyramidal masonry. Arthur's Quoit, a slab of rock measuring seven feet across, was next noticed lying near Long Bridge and by the roadside. At Bossiney was an ancient earthwork, while in the Vicarage at Trevenna was a rather rare columbarium. Passing on, the lecturer described the Church of St. Materiana, a conspicuous object not far from the edge of a precipitous cliff, and so exposed is its site that the gravestones required stone buttresses to withstand the force of the Atlantic gales. From its proximity to Tintagel Castle, it might be expected that some interesting and ancient work would be discovered, but such was not the case, the alterations and restorations in 1854 and 1868 rendering certainty as to the dates of its masonry almost impossible. The smallness of the ancient windows of the nave was remarked upon, together with the narrowness of those on the north side of the church. The transepts were discovered to be unusually long, while it was seen that the nave and chancel gradually narrowed towards the east end. The Lady Chapel was described as very small; but resting on masonry and leaning against the east wall was a dilapidated slate altar slab, upon which were traced a consecration cross and two others of a rough description, so that the mensa had evidently been altered. The interior of the church produced the effect of permanence, and for this artistic reason the lecturer thought that people were wont to admire Norman work as a dumb witness of the deeds of many generations of humanity. At Tintagel they had the thick walls and narrow windows so evidently for defence. Mr. Reed gave it as his opinion that the church might have been used as a fortress; at least, it was evident that this idea was in the minds of the builders of those days. Against the south wall of the south transept was a monolith, which for many years formed part of the lych-gate upon which the coffins were placed. This was discovered by Mr. Jago, the Cornish antiquary, to have an inscription. He had no doubt it was a Roman milestone, set up at the beginning of the reign of the Emperor Licinius (307 to 324).—On the motion of the Chairman, seconded by the Rev. D. W. Oldham, Mr. Reed was thanked, and it was resolved that the paper be printed in the transactions. The Rev. D. W. Oldham asked whether any date could be assigned for the erection of plaster ceilings,



Illustrations to Student's Column.

which were so prevalent in Devonshire country churches. The Rev. R. Medley Fulford expressed the opinion that plaster ceilings came into vogue when slates were being substituted for shingles and as a cheap means of keeping out draughts. Mr. Jerman and Mr. Reed concurred, and the former suggested the early part of the middle of last century as the date of the introduction of ceilings.

ENGINEERING SOCIETIES.

THE INSTITUTION OF JUNIOR ENGINEERS.—On Friday, last week, the Chairman, Mr. Basil H. Joy, presiding, the Institution held at the Westminster Palace Hotel a joint meeting with the Discussion Section of the Architectural Association, when a paper on "Factory Design" was read by Mr. J. H. Pearson, a member of both societies. The paper dealt chiefly with the requirements in the design of factories for London, and its vicinity. In introducing the subject the author insisted upon the importance of a close relationship between the architect and engineer, as it was only by consultation together, and united action, especially with regard to buildings of the factory class, involving the employment of machinery, that a satisfactory result could be arrived at. The sections of the London Building Act, 1894, which had special reference to buildings of the factory type, were touched upon, and the different kinds of buildings were classified. It was shown how the design and construction were affected not only by the character of the machinery to be installed, but also by the form of power adopted for driving it. Systems in use at the present time were briefly reviewed, preference being given to electricity. In considering the question of elevation, the good architectural effect obtained from the use of parti-coloured bricks was indicated, and the opinion expressed that stonework should be sparingly introduced, on account of its inability to withstand an excessive heat should a fire occur; its employment should be confined to copings, window-sills, strings, and steps. Materials of construction were then considered, a number of specimens being exhibited to the meeting. Referring to foundations, wherever the nature of site and subsoil was at all doubtful, a continuous bed of concrete over the whole surface was advised, as by that means a uniform pressure of the loads upon the foundation was secured. Fire-resisting floors and staircases having been discussed, the author proceeded to consider details for the construction of roofs, partitions, windows, and skylights. Furnace chimney shafts received attention at some length as did also the questions of ventilation, sanitation, and fire-protection, with special reference to the Factory Act of 1895. The construction of a factory with which the author had been associated was described and illustrated, and an interesting account given of the method of putting on an additional top floor, without meanwhile interrupting in any way the business ordinarily carried on, and without taking to pieces the existing roofs, which were raised by screw-jacks.—An animated discussion ensued, in which Messrs. M. Garbutt, P. J. Waldram, J. Pearson, T. C. Morewood, H. H. Statham, W. Worby Beaumont, H. C. Reid, H. J. Leaning, H. J. Young, E. A. Berry, Max Clarke, and W. R. Beckton took part; and the proceedings terminated with a vote of thanks to the author. It was announced that the Institution would hold a Conversazione on Saturday, March 11, and that at the ensuing meeting a paper on "The Direct Production of Electricity from Carbon," would be read by Mr. W. R. Cooper, M.A., M.Inst.J.E.

The Student's Column.

ARCHITECTURAL HYGIENE.

VI.—HOUSE DRAINAGE.

UNDER this section we shall consider underground drains, and include their laying, inspection, and general disposition.

Stoneware Drain Pipes. — Underground drains should be constructed of glazed stoneware. The pipes are usually made in 2-ft. lengths, and are of cylindrical form, with a "socket" at one end and "spigot" at the other. Both ends have ridges and furrows formed on them, so that the jointing materials are more easily held in position. In London those that have been tested by hydraulic pressure should be used.

The pipes should be truly laid and securely jointed, and should have a fall of at least 3 in. in 10 ft. (*i.e.*, 1 in 40) for 4-in. pipes, 1 in 60 for 6-in. pipes, and 1 in 90 for 9-in. pipes. In ordinary house drainage a fall of 3 in. in 10 ft. (1 in 40) is generally adhered to where it is possible to obtain it, but in towns one often has to be content with $2\frac{1}{2}$ in., or even 2 in., in 10 ft. A long drain with a flat gradient should always have an automatic flushing tank at it highest point, so as to ensure thorough flushing at intervals.

All drains should be laid as straight as possible from one point to another, thus shortening the length of drain, facilitating cleansing and inspection, and ensuring that the excreta shall be carried away as quickly as possible. Where it is necessary to have bends, they should be of as easy a curve as possible, so that no obstructions may be likely to occur.

The pipes should be laid on a bed of concrete 6 in. in thickness (as shown in fig. 33), formed with care to the required fall. The pipes are then laid in position, commencing at the lowest part of the drain, the spigot end being placed in the socket end of the pipe next below it. The space underneath the body of the pipe should then be packed up carefully with concrete, so that the whole of the pipe, and not only the socket, may rest on the solid concrete. If the latter only rest on the concrete, any weight from above would be liable to cause the fracture of the pipe, on account of its support being only at intermediate distances.

Jointing.—The jointing of drain pipes is a most important consideration, and too much stress cannot be laid on this point. The drains may be in perfect alignment on a solid bed of concrete, but the drainage system will be faulty if the joints between the pipes are not absolutely water-tight.

The simplest and one of the best joints is, without doubt, that formed with neat Portland cement or in cement and sand in equal proportions wiped round the socket before the spigot is driven home into position. The inside of the pipe should then be carefully wiped out to preserve the clear bore of the pipe without obstruction, and a fillet of cement should be wiped round the outside of the joint. In order to ensure that the bore of the pipes shall be quite clear at the joints, cylinders of india-rubber are sold for various sizes of pipes, and these can be drawn through by the drain layer as each section is placed in position. In laying the pipes care must be taken to keep the bore of the adjacent pipes concentric. If cement be placed in the bottom only of a socket and the next pipe pushed home, the weight of the pipe will displace the soft cement until the spigot end of the one rests on the inside of the socket of the other. The joint is too close at the bottom, too wide at the top, and there is a ridge inside each joint. The pipe can be packed up with brick chips, or a

gaskin of yarn all round is sometimes used. In making joints the hands should be able to reach every part of the outside of the pipe. The fillet formed on the outside should be trowelled smooth all round.

Various patent methods and substances for making joints have at times been placed before the profession.

Patent Joints.—Chief amongst these is that known as "Stanford's" joint, shown in figs. 34 and 35, in which a composition of coal-tar, sulphur, and ground pottery is formed on the spigot and socket ends of the pipes, which are then greased and fitted into one another. The ball-and-socket principle allows of a certain amount of deflection, and the possibility of obstruction by cement passing into the body of the drain is avoided. Another method is Doulton's patent self-adjusting joint, which is supplied on the best London tested pipes. In this the joint is effected as shown in fig. 36. Doulton's patent joint is very useful in relaying drains where the flow of sewage cannot be altogether stopped, as in large hotels and public institutions. The pipes can be laid in the water, but when completed a fillet of Portland cement should be placed outside each socket.

A caution is necessary here against the jointing of pipes by means of clay, for, until within comparatively recent years, clay was frequently used. Of course, it forms no reliable joint at all, and should on no account be allowed. It has sometimes been employed in connexion with cement, the inner part of the joint being puddled around with clay; but a little reflection will show that if it is bad anywhere it is bad everywhere, and it should never be allowed to be used.

Iron Drain Pipes.—Iron pipes are preferred by some architects, especially for drainage under houses, one of the chief reasons for their employment being that systems in which they are employed have fewer joints—the iron pipes being obtainable in 9-ft. lengths. Bends and junctions are also obtainable for these pipes, as shown in figs. 37, 38, 39, and 40. The jointing of such pipes is effected by means of tow and lead.

Iron pipes are frequently necessary in deep basements, or in places where pipes have to be slung up to the walls, owing to the depth of the sewer being such that they cannot be taken under ground. In such a drain iron pipes, because of their transverse strength, are easier to place in position.

Whenever iron pipes are used, they should be subjected to some preservative process in order to prevent them from rusting. In the *Bower-Barff* process the pipes are subjected for some twelve hours to the action of superheated steam, after having themselves been raised to a very high temperature; they thus become coated with the black oxide of iron. In *Dr. Angus Smith's* system the pipes are heated to a certain degree and then dipped in a special solution. Neither process can be considered quite perfect, for an accident may chip off the oxide coat formed by the Bower-Barff process, or Dr. Angus Smith's composition may wear slowly away; but it should be mentioned that it is calculated to last about forty years.

The case for and against the use of iron pipes has been debated over and over again. Architects, as a rule, prefer glazed stoneware pipes because they are practically indestructible from the interior. But iron pipes are often specified for under-house drains because of the fewness of joints. Even in this case some prefer stoneware pipes, provided they are encased all round with 6 in. of concrete. In America the general opinion seems to be entirely in favour of iron piping.

Size of Pipes.—With regard to the size of drain pipes that should be used, there is no doubt that in the past the mistake has been in using pipes of too great a diameter. For ordinary dwelling houses, pipes of 4 in. internal diameter are quite sufficient. A pipe of 4 in. diameter with a fall of 1 in 40 will discharge 140 gallons per minute, which is never likely to be exceeded in an ordinary dwelling house.

In large mansions or in public buildings the size of the pipes must be increased as the system gets nearer the outlet and receives more discharges. This is usually effected where manholes occur by means of half taper pipes, as described later; but an illustration is shown of an ordinary whole taper pipe (fig. 41). In addition to the ordinary straight pipes, 2 ft. long, other pipes of different forms are made to answer certain purposes.

Junctions.—Chief among these are the *junctions* which are necessary where one line of pipes is connected to another line. The chief point relative to the construction of these is that they must be made in the direction of the sewage, never at right angles; this is necessary in order that the contents may be directed well in the direction of the fall. Junctions are best made by means of half pipes in inspection chambers, but short branches from soil pipes and wastes may be joined to main drains direct by means of ordinary junctions. Junctions are effected by means of the V junction, double junctions, single or Y junctions, and taper junctions. Of these the Y junction is shown in fig. 42; the double junction in fig. 43; the single junction in fig. 44; the taper junction in fig. 45.

Bends.—Bends are necessary where the drainage has to be led round a corner. Bends of various curvature are made to suit special circumstances. Of these, figs. 46 and 47 are shown, so that the student can realise their shape. Bends should be used with care and so as to prevent all sharp turns, which would have a tendency to impede the flow of the sewage. A taper bend is also shown in fig. 48.

An excellent bend made by Messrs. Broad & Co. is the "pedestal bend," shown in fig. 49. This is to take the discharge of the vertical soil pipe where it meets the ground drainage. It will be seen that it has a horizontal base fixed to it, so that a direct seat can be obtained on the concrete bed which would be laid to receive it.

Inspection of Drains.—Although a system of drainage should if properly executed be faultless, and in fact may be so, yet in practice it is found to be necessary to have at certain points along the line of pipes means of access, so that by means of drain rods any obstruction can be removed if occasion requires it. This is the more necessary, inasmuch as the domestic servant seems to regard the water closet pan as the proper receptacle in which to deposit anything that cannot be got rid of in any other way without trouble. Such being the case, articles are often passed through the water closet trap and so into the drains which ought never to be deposited there, for instance, old rags, &c., and so it comes about that drains get clogged up.

Inspection Chambers (or manholes, as they are sometimes called) are, therefore, introduced at such points as the architect considers necessary, so that the whole drainage system can be thoroughly overhauled if necessary. In a similar manner each separate section of a drainage system can be tested by the water test at any subsequent period to its installation. Figs. 50, 51, and 52 show such an inspection chamber. They should be built, where possible, in white glazed bricks laid in cement mortar, the wall of the chamber being one brick in thickness, with two courses of footings; a bed of concrete, one foot in thickness, being underneath the whole area of chamber and footings. The object of using glazed bricks is that the chamber can be kept perfectly clean, and can be cleaned periodically from the splashings which are certain to occur; being of white glazed bricks, and, therefore, impervious, all dirt is easily seen and washed away. If expense prevents the use of white glazed bricks, salt glazed bricks may be used, and if these are too expensive, stock bricks can be used and rendered in Portland cement on the inside. The whole drain pipes are made to run into the manhole and then continued in the manhole by pipes of semi-circular section, or channel pipes as they are more usually called, as shown in figs. 50 and 52. These were formerly semi-circular in section, but in order to provide as deep a channel as possible 6 in. pipes are now made with a channel section of 4½ in. deep, and 4 in. channels 3 in. deep. The advantage of these is apparent, there is less danger of overflowing than in the ordinary section. Channels of a section of three-quarters of a circle are also made with the same object in view.

The junction between the circular pipe and the channel is generally made at the inside face of the wall; but for effecting a better junction between the two, Messrs. Broad have introduced connecting pieces of the shape shown in figs. 53 and 54, by means of which a better junction is obtained, the flat portion supporting the wall without unnecessary cutting away.

The branch drains enter at various angles, and are terminated, as before mentioned, with channel bends. These must be carefully set in the bed of cement concrete forming the floor of manhole, and must be so arranged with curved pipes as to direct the flow without splashing, and with as little friction as possible. The pipes being set in cement, the space between them and the wall, or any other pipe, should be "benched" up as shown on cross section (fig. 51) in neat Portland cement, so that in case of splashing, the sewage immediately falls back into the channels.

Disconnection of Drains.—We shall discuss the different kinds of traps later on, but we should state here that it is necessary to disconnect the house drainage from the sewer by the insertion of an intercepting or disconnecting trap on the sewer side of the manhole, as shown on the section of manhole which illustrates the Crapper disconnecting trap, fig. 50. Various makers have taken out patents for these intercepting traps. In the fig. 55 the one associated with Messrs. Broad's name is given. It is fitted, as are all intercepting traps, with an inspection arm, provided with an air-tight plug formed by a cap fitted with a Stanford joint, which should, before fixing, be lightly coated with grease dressing. When placed in position it can be wedged tightly home by the action of turning it. The inspection arm is useful in case of a stoppage occurring between the manhole and the sewer, as the cap can be removed and drain rods inserted.

Access to Drains.—A man can by the use of drain rods obtain access to any of the branch drains which discharge into the manhole or the main drain; and by the aid of the inspection arm of the trap the piece of drain between the manhole and the sewer can be cleared. This is the chief value of the manhole, though we shall see that it is also used as a means of distributing a current of air through the drains; and although it necessitates a certain first cost in laying down a drainage system, yet the cost is saved many times over, because it is not necessary to break up the ground in various places in order to clear a stoppage.

Inspection Pipes are occasionally used in the length of a long section of drainage where it is not considered necessary to go to the expense of an inspection chamber. One form is shown in fig. 56.

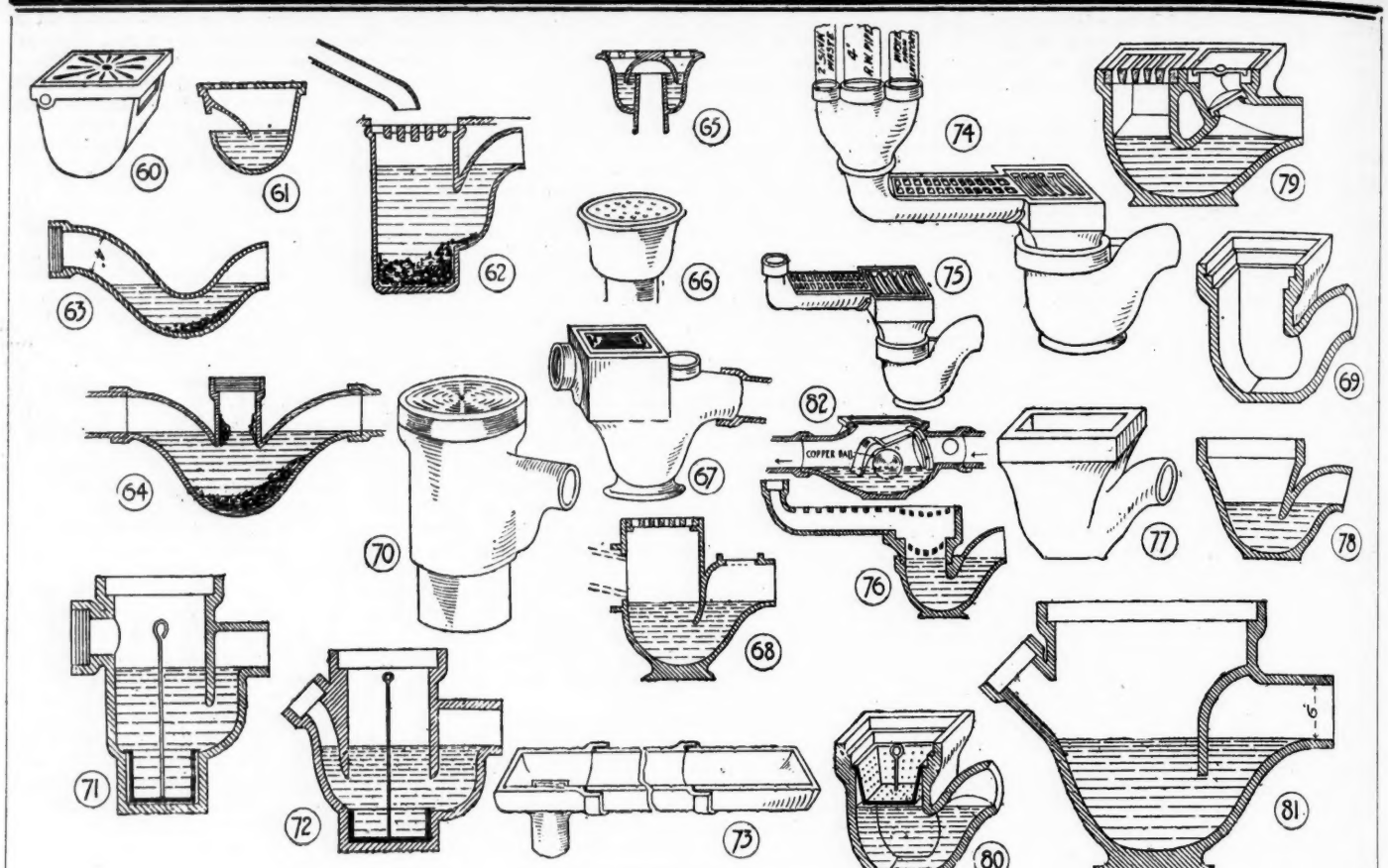
Manhole Covers.—The manhole should in towns and confined spaces always be covered with a perfectly air-tight cover. Figure 57 is an illustration of one made by Messrs. Broad. The section will explain itself; the cover is sent out fitted with india-rubber joints, and is also provided with grooves to be filled with grease, soft soap, and sand; the covers are held down by four gun-metal screws. Another form which has been used of late is that shown in the accompanying illustration (fig. 58). In this, it will be seen, there is a double trap, an outer trap formed of an iron cover resting in a groove filled with tallow, fat, or soft soap. The inner or lower trap is formed of a dome-shaped cover, on the underside of which the moist air of the drains is condensed and collected into a trough at its bottom edge. This water-seal is kept continually filled by the condensing action of the drains. It is patented by Mr. John Jones, of Chelsea. In the country and districts well separated from surrounding houses there is no necessity for an air-tight cover, but only an open grid (fig. 59), which prevents anything falling into the manhole. In this case the grid forms the air inlet to the drains; and no inlet pipe is required.

VII.—HOUSE DRAINAGE (*Continued*).

Underground Drainage Traps.—Besides the intercepting trap previously mentioned, traps are required at the feet of waste pipes from *baths*, *lavatories*, and *sinks*, and at the feet of rain-water pipes; in fact, for every pipe excepting a soil pipe. These traps are generally known as "gully" traps, and are made in numerous shapes and sizes.

Traps are necessary in order to disconnect the vertical pipes attached to the sanitary fittings from the ground drains, and, provided these latter are properly ventilated, the water seal in the traps effectually accomplishes this disconnection, and a current of fresh air is enabled to pass up the vertical pipes and to keep them sweet and clean. The waste pipes are arranged so that they discharge immediately over the trap, or they may be brought in behind, in which case all splashing is avoided.

Lip Trap.—Formerly the old "Lip" trap, figs. 60 and 61, was much in vogue; but it will be observed that there are corners in which sewage can be deposited; further, it was made in cast iron, and having no socket, was difficult to connect properly with the drainage pipe. The trap shown in fig. 62 is a bad form of



Illustrations to Student's Column.

gully because it is not self-cleansing, but contains a considerable quantity of water, and the bottom portion forms a catch pit for the collection of filth. It should never be used.

Syphon or U-trap.—A kind of trap which was one of the earliest forms, and frequently used in underground drainage, was the syphon or U-trap, fig. 63. This is a bad form, partly on account of the quantity of water it contains, which is so large that an ordinary flush from a lavatory or water-closet would not empty it; partly on account of its non-cleansing qualities, the solids remaining in the bottom of the trap on account of the want of pressure of water. The introduction of an inspection pipe, as shown in fig. 64, only made matters worse, as the solids got pushed up into the pipe, and were only removed by the drainage-rods from above. There is one word of warning which should be given, and that is, never to use, or allow to be used, what is known as the "bell" trap (figs. 65 and 66). This form was formerly much used for yards, scullery sinks, &c. As will be seen, it is of a non-cleansing type, and when the "bell" is removed, which is often done by servants knowing no better, there is no trap at all, but direct communication with the drain.

We may now proceed to discuss the best forms, which are designed so as to keep their seal, and to be self-cleansing as far as possible.

Gully traps are now usually made of the form shown in figs. 67 and 68, which give an elevation section of a gully trap for receiving a lead or iron rain-water pipe. In this case the rain-water is led into the trap under an iron grating in order to prevent splashing. Some of the vestries insist that it shall discharge over the grating, in which case fig. 69 illustrates the section of gully trap recommended to be used.

The waste-pipes from baths and lavatories are treated in the same way.

Grease Traps.—The waste-pipes from *scullery* sinks bring us to a rather more complicated problem, namely, the prevention of the entry of grease into the drains. In order to effect this special traps are used. They consist of a trap large enough to collect the fat from the greasy water which is carried off by the sink waste. The number of patent grease traps is legion, but illustrations of one or two are given. Dean's grease trap (also used in yards, &c.), is shown in figs. 70 and 71. It will be noticed that the sink waste discharges under the iron grid, which is level with the ground. There is a deep seal, and the grease naturally floating is thus prevented, to a large extent, from going into the drain beyond the trap. The bucket, which rests in the bottom of the trap, is provided with a long handle by means of which it can be raised at necessary intervals, and both the solid matters which have fallen into it and the grease which is floating on the top can be removed. Fig. 72 shows a grease-trap made by Messrs. Winser & Co., in which a still wider space is left for the congealed grease.

The great objection to all grease traps is that they become little cesspools if not frequently cleaned out. In large country mansions and hotels they are necessary, as the amount of grease and dirt discharged from a scullery in such cases is very great. They should then be placed under supervision and be cleaned out two or even three times a week.

In ordinary dwelling houses, it is doubtful if grease traps are desirable; and considerable diversity of opinion exists among authorities on this subject.

Probably the best way of treating the wastes from sinks is to follow out the recommendations of the Local Government Board that all wastes should discharge over an open channel connected with a trapped gully. Fig. 73 shows what is known as "Duckett's" self-cleansing channel gully; in this case the greasy sink water has time to congeal while passing towards the gully trap, and can be cleaned off daily. Further, it is visible, and if not cleaned away would give rise to smells which would draw attention to it. The ordinary grease trap falls in with that condition which is always insanitary, viz., "out of sight, out of mind," whereas the discharging over an open channel obviates this difficulty. Fig. 74 shows an illustration of Broad's channel shoe and reversible gully trap, in which the waste from a bath and lavatory, a rain-water pipe, and also a sink waste, is all discharged by means of a three-way head into an open shoe, and thence to the gully trap. In this case an iron grid may be used, but it is probably better left wide open, although if it is also made to take the surface water from a yard some form of grid is necessary to prevent débris finding its way into the drain.

Generally speaking, we should say that every gully should be made to do as much duty as possible, as the number in use can thereby be reduced. The position of the rain water and waste pipes decide where they are to be fixed, and the paving may also be laid so as to make them do duty for surface drainage. If possible, no surface gully should be without a waste pipe discharging into it, so as to keep it sealed during dry weather. In positions where many leaves fall or much waste-paper is blown about, gullies should be covered with wire cages to keep the litter off the gratings.

Figs. 75 and 76 show a view and section of a similar arrangement to take simply the 2 in. waste from a sink.

Surface Drainage.—Yards, areas, and other open spaces are drained in a similar manner, by having their surfaces laid to falls. Figs. 77 and 78 show in elevation and section a yard gully as used extensively by the London School Board. It has a flat bottom, and should rest on a bed of concrete. In this case no grid is used, the surface-water being led direct into the trap, the water of which is therefore visible from above. It is made with either P or S outlets, to suit the inclination of drain. Beside the traps enumerated above, many are made with inspection eyes, so that if a stoppage occurs it can be easily removed by means of drain rods. It will be readily seen that to pass a drain rod from above, through the curved space forming the trap, is almost impossible. Fig. 79 shows an air-tight stopper on the drain side of the trap, which can be taken out and the drain rods inserted into the length of pipe. There is always, of course, the danger that this may become unsealed, in which case the outlet would be in direct communication with the drain. Where it is likely that a considerable amount of sand and grit will be washed down a gully it is advisable that a space should be provided for solids to accumulate in (figs. 70 and 71), so that these can be removed from time to time. They are also useful in large warehouses, in the basements, as the latter, when washed down, carry a large amount of dirt in the water, which can thus be collected and prevented from entering the drain.

In *stables* there is the same difficulty to contend with, and Messrs. Broads' stable gully (fig 80) is designed to intercept particles of straw which may have passed through the top grating, the perforated bucket below lessening the possibility of the drain becoming choked. In the Express Dairy Company's cow-houses there are no gullies inside, but they are placed outside, the drainage being led to them in open white glazed channel pipes covered with strong galvanised iron gratings. When cleaning the houses the gratings are lifted, taken out, and washed, while the stalls, gangway, and channels are cleaned with a hose pipe.

Various other gullies have been designed, and one of them is the *flushing gully* of the form shown in fig. 81, often used for sink wastes. It is connected at the back with a flushing tank holding some thirty gallons which discharges automatically from time to time. Such a discharge undoubtedly helps to keep the drains clean.

Before passing from this subject, attention

should be drawn to the prevention of what is known as "back flow," that is, the return of sewage from the sewer back to the house drainage. This is only liable to occur where the main drainage is not of a sufficient depth to secure immunity from floods. Fig. 82 shows a method of preventing this. The diagram explains itself. A copper ball floats in the intercepting trap, and in the event of any back flow effectively stops up the opening on the house side of the drain. The patentees of this trap are Messrs. G. & F. Couzens.

The traps here dealt with are those which are fixed in the ground outside the building in the system of house drainage. Traps used inside the building are treated in a later article.

GENERAL BUILDING NEWS.

ST. AGATHA'S CHURCH, SPARKBROOK, BIRMINGHAM.—Preparations have been made for the erection of a new church, dedicated to St. Agatha, at Sparkbrook. The church is to be erected on a site adjoining Stratford-road Board Schools, from plans by Mr. W. H. Bidlake, architect, Birmingham. The building is to be carried out in red brick, with stone dressings and green slate roofs. The church will present a symmetrical front to Stratford-road, consisting of a tower over 100 ft. in height, flanked by two deep porches, and having at the base a baptistry projecting as an octagonal apse. The total length of the building is 170 ft. The narrowest part will be 60 ft. at the commencement of the nave, but from that point the church is to open gradually until the extreme width of 78 ft. is reached at the chancel. Seating accommodation is to be provided for 1,000 worshippers on the ground floor—the organ chamber, which is to be placed over the choir transept, being the only part raised above the ground floor. The church is to be lighted by a number of traceried windows, the largest being the one in the chancel. The church will be completed in about eighteen months, and the total cost is estimated at 10,000*l.*

CHANCEL, OLDBURY-UPON-SEVERN CHURCH.—The chancel of this church has been restored and opened. The windows and roof of the church are entirely new, as is also the major portion of the walls, the disastrous fire in 1897 leaving only the case walls, and these, after an examination by the architect, Mr. Waller, of Gloucester, were found to be in several places in a state unfit for restoration. The whole of the work has been carried out, as far as the old drawings and masonry would serve, to represent the former building; but where improvements could be effected, advantage was taken to carry the same into effect. The chancel, vestry, and tower are all now restored, and the contractors anticipate that the whole building will be completed by April.

BAPTIST CHURCH, LOWESTOFT.—A new Baptist Church, which has been built on the Grove Estate, London-road, Lowestoft, was opened recently. The new church has seating room for upwards of 700 persons. The seating in the body of the church and in the galleries, which is of pitch pine, is arranged in semi-circle form, whilst the choir seats are arranged in tiers on each side of the organ, behind the platform and Communion Table. The pulpit is of Caen stone, with green marble shafts. The whole of the work has been carried out by Mr. John Ashby, builder and contractor, South Lowestoft, from the designs and under the superintendence of Mr. Geo. Baines, London.

ART SCHOOL, WORDSLEY.—On the 6th inst. the Earl of Dartmouth, Lord-Lieutenant of Staffordshire, opened the new School of Art which has been erected at Wordsley, near Stourbridge. The building has been erected in the main street, from the plans of Mr. T. Robinson, of Stourbridge, at a cost of about 1,000*l.* The building is of red brick, with buff terra-cotta facings.

BOARD SCHOOL EXTENSION, SHEFFIELD.—On the 6th inst. a new girls' department was opened as an extension of the Gleadless-road Board Schools, Heeley. The architect, Mr. C. J. Innocent, has provided in the school large separate rooms for cookery and manual instruction. The contractor was Mr. John Lister, of Aston. Messrs. J. C. & J. S. Ellis have put in the heating apparatus.

SCHOOL, ASHLEY DOWN, BRISTOL.—The formal opening of the Ashley Down School, Downend-road, Ashley Down-road, took place on the 7th inst. The premises are arranged to seat 690 scholars in three departments. The central hall system has been adopted. The materials of which the schools have been constructed are local bricks, Bath stone dressings, and Bridgwater roof tiles, the whole of the floors being composed of wood blocks. The general contract was in the hands of Mr. E. Walters, of Montpelier, Mr. G. F. Tuckey being entrusted with the plumbers' and sanitary work. Messrs. Walter S. Paul and James and Mr. G. C. Laurence were the joint architects of the buildings, and Mr. S. White acted as clerk of works.

ABERDEEN ROYAL LUNATIC ASYLUM.—At the annual meeting of the Aberdeen Royal Infirmary and Asylum, the directors were authorised to proceed with the reconstruction of the main asylum, in accordance with plans by Messrs. W. & J. Smith & Kelly, architects, Aberdeen, at an estimated cost (including new kitchen) of 40,000*l.*

PROPOSED FEVER HOSPITAL, SCARBOROUGH.—Dr. F. St. George Mivart, one of the Local Government Board Inspectors, held an inquiry recently in the Town Hall, Scarborough, with reference to an application by the Corporation for power to borrow 15,000*l.* for the erection of a fever hospital in Newley-lane. Mr. Harry W. Smith, the Borough Engineer and Surveyor, gave evidence. There was no opposition to the application.

PARISH CHURCH HALL, MACDUFF.—Contracts have just been accepted for the erection of a new hall for the congregation of the Parish Church, Macduff. Some time ago a site in Market-street was purchased, and there building operations will soon commence. The architect is Mr. Wm. Dawson, Sunnyhill. The stone to be used will be Pitsligo granite, and the hall proper will accommodate 500 people. The cost is estimated at 1,000*l.*

NEW EMPIRE PALACE, SOUTH SHIELDS.—On Monday the new Empire Theatre of Varieties was opened at South Shields. The new building will accommodate 3,000 people. The designs were prepared by Mr. Frank Matcham, architect, London, in conjunction with whom Messrs. Milburn, architects, of Sunderland, have supervised the work.

BUSINESS PREMISES, BELFAST.—New premises for Messrs. Wm. Strain & Son have been erected in Great Victoria-street, Belfast. The buildings are five stories in height. The work has been carried out by Messrs. W. J. Campbell & Sons, from the plans and under the superintendence of Mr. Samuel Stevenson, architect.

PUBLIC LIBRARY, BOROUGH-ROAD. — A public library was opened in the Borough-road on the 8th inst. by the Right Hon. James Bryce, M.P. The building is placed about 20 ft. from the pavement in the Borough-road. It consists of a basement, ground floor, and first floor, with an attic floor over the portion assigned to the librarian's residence. The basement extends over the whole area of the building, and in it are the heating chamber and the coal cellars; the rest of the space being available for the storage of books, and repairs and unpacking, &c. The ground floor is placed about 3 ft. above the level of the pavement. On entering, one reaches the ladies' room on the right-hand side and the news room on the left-hand side, the public portion of the lending library being in front. The boys' room has a door opening into the news room. On the first floor is the reference library and magazine-room with book store attached. A spiral staircase from the book store communicates with the lending library and basement below. Adjoining the reference library is the committee room. There is a separate entrance for the librarian's staff, and this entrance also leads to the librarian's residence. The exterior facings of the wall are of red brick, with terra-cotta dressings, the roof being covered with slates. The contractors were Messrs. J. Smith & Sons, of Norwood, and the building has been carried out from the designs, and under the superintendence, of the architect, Mr. A. Blomfield Jackson.

LIVERPOOL NEW POST-OFFICE.—By permission of Mr. W. H. Preece, C.B., F.R.S., acting in his dual capacity of President of the Institution of Civil Engineers and Engineer-in-Chief of the General Post-office, members of the Liverpool Engineering Society recently inspected the new Post-office fittings and machinery. Among those present were Mr. E. Ashton (superintending engineer), Mr. D. P. Walsh (assistant superintending engineer), Mr. H. Tanner (Chief Architect of the Office of Works, the architect of the new post-office), Mr. W. Woolven (clerk of works), Mr. E. W. Rees (electrician), and Mr. J. A. Brodie (President, Liverpool Engineering Society and City Engineer). The new building covers nearly two acres of ground, while there is provision for future extension towards Whitechapel.

NEW HALL, BATTERSEA POLYTECHNIC.—The hall at the Battersea Polytechnic has just been opened. It occupies a space at the east end of the Polytechnic ground left vacant for it in erecting the main buildings, with the style of which it is in harmony. It is built of red brick and Bath stone, the roof being covered with brown tiles and surmounted by an oak turret. Internally the hall is 85 ft. long and 56 ft. wide, while the crown of the arched ceiling is 43 ft. above the floor. The stage is 34 ft. by 16 ft., and has an organ loft above it. Behind the platform are three rooms, which when not required for purposes connected with the hall will be used for music classes, and underneath are two workshops for masons and plasterers' work. The gallery extends across the end of the hall opposite the stage, and will accommodate 180 people, the body of the hall accommodating 780. The hall is to be used for examination purposes, for meetings of students, and for the holding of popular concerts and entertainments and exhibitions. Mr. H. Holloway was the builder, the architect being Mr. E. W. Mountford.

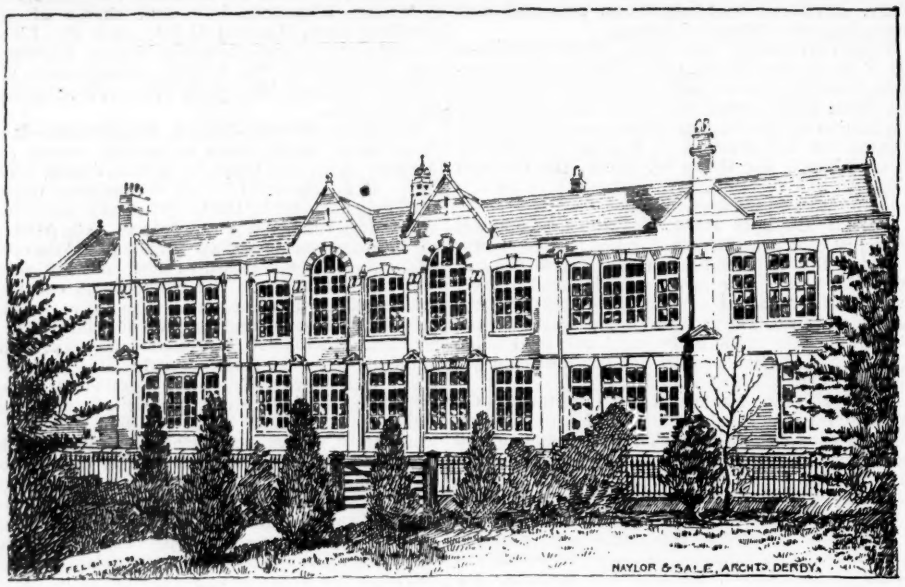
CHILDREN'S HOME, WAVERTREE, LIVERPOOL.—Richmond Lodge, Wavertree, has been acquired by the Toxteth Board of Guardians, and converted into a home for children. Mr. Walter W. Thomas has been the architect, under whom, with the assistance of Mr. Henry Hallard, clerk of works, the scheme has been carried out. Mr. J. Dilworth, Wavertree, has been the contractor, Messrs. Range & Wright, Wavertree, have had charge of the plumbing work, Messrs. J. B. Johnson & Co., Liverpool, the slating and plastering, Messrs. Harlow & Son, Macclesfield, the heating arrangements, and Messrs. Goddard, Massey, & Warner, Nottingham, the ironwork.

PROPOSED PUBLIC BATHS, STRATFORD.—It is proposed to erect public swimming, warm, and Turkish baths, and shops in Romford-road, Stratford. It is intended to erect the buildings upon a site lately acquired by the Corporation at the corner of Romford-road and Vicarage-lane. The frontage to Vicarage-lane is shown (in the plans) occupied respectively by six lock-up shops, and six shops with residences over. The public baths occupy a small part only in the centre. The main frontage faces Romford-road, and the present building line is adopted. The following accommodation is provided in the public baths: Entrance and waiting-hall, first-class men's swimming bath, second-class men's swimming bath (which will also be used for women), club-room (first-class bath), six first-class men's warm baths, twelve second-class men's warm baths, five first-class women's warm baths, five second-class women's warm baths, a separate waiting-room to each class, small Turkish bath, committee-room, ticket office, superintendent's offices, towel store, laundry, boiler-house, engine-room, coal stores. The building is set back from the public footway, and there is a wide court-yard in front of it. Three paved pathways traverse the court-yard from the public footway up to the entrances, viz., men's general entrance, women's entrance and private door. A paved corridor, 6 ft. wide, leads to the waiting hall of the first-class swimming bath at the lower end of the site. Dressing boxes are provided round the walls, over which a wide gallery extends all round, access to which is obtained by three staircases. The bath is 100 ft. long by 30 ft. wide, with a depth ranging from 6 ft. 6 in. to 3 ft. 6 in. The roof is shown supported by wrought-iron trusses, resting on cast-iron ornamental columns. A large skylight and lantern would afford light and ventilation. The latter would be aided by an electrical fan placed in the end wall. The club-room (21 ft. by 14 ft. 6 in.), which would be fitted with lockers, &c., is approached from the gallery. The second-class bath is shown fitted with separate dressing boxes. There is no gallery. The bath is 72 ft. 6 in. long by 24 ft. wide, with a depth varying from 6 ft. to 3 ft. The Turkish baths comprise a frigidarium (20 ft. by 16 ft. 6 in.) a tepidarium (19 ft. 6 in. by 16 ft. 6 in.), and two hot rooms (each 18 ft. by 8 ft). These rooms would have tiled floors and walls. The architect, Mr. A. Saxon Snell, estimates the cost of these baths at 26,000*l.*, the cost of the two blocks of shops respectively at 4,000*l.* and 6,500*l.*

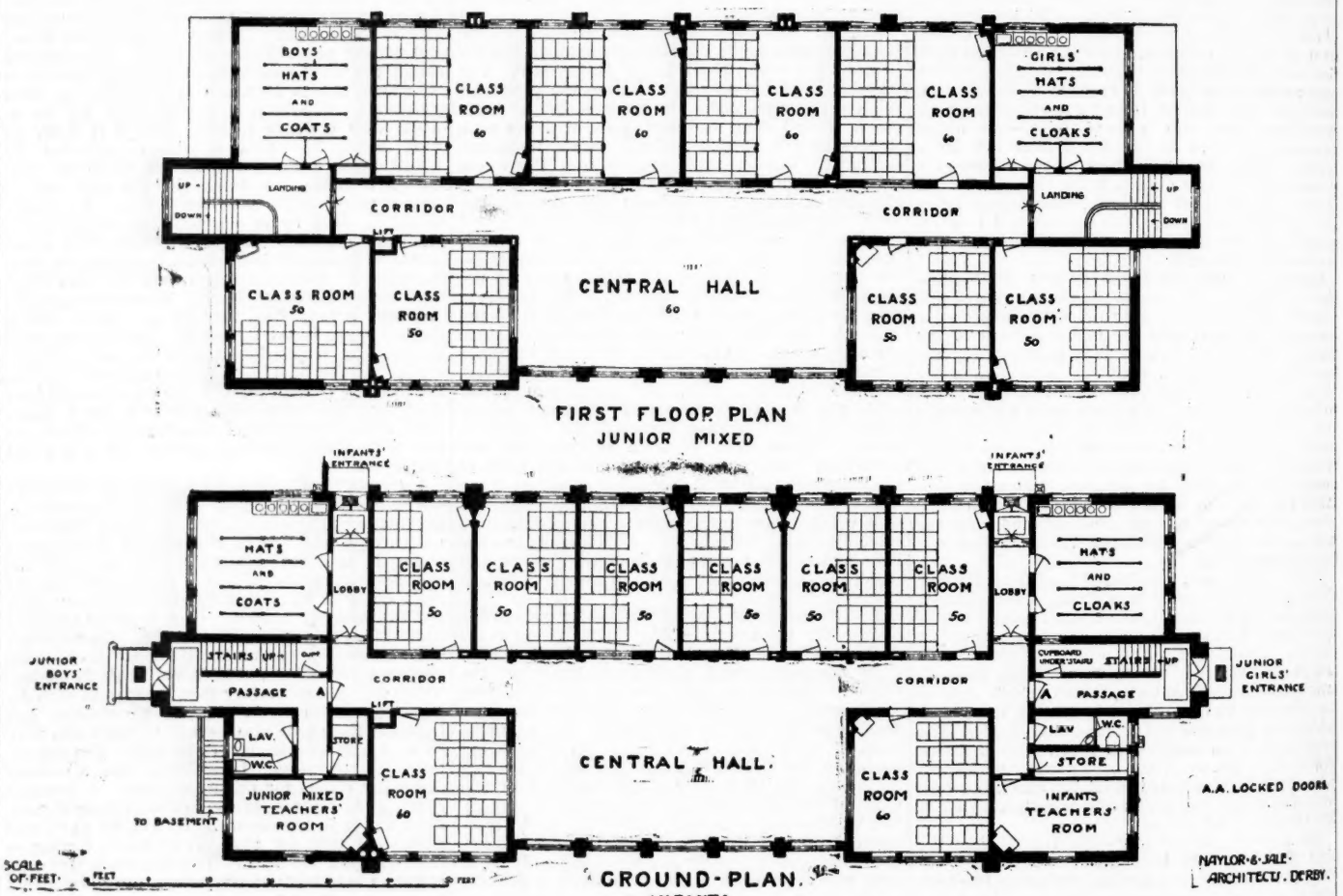
UNIVERSITY MEDICAL BUILDINGS, ST. ANDREWS.—The University Medical Buildings, St. Andrews, are situated in Queen's-terrace, at the southern side of the city, and are in the English Renaissance style. It is about eighteen months since building operations commenced, and it is expected that the main or front block will be ready for occupation for the summer session. The practical anatomy part has been in use for six months. The buildings will accommodate four scientific departments—viz., anatomy, physiology, botany, and materia medica. There will be a laboratory 38 ft. by 27 ft. in each department for materia medica, physiology, and botany. Each will also have a lecture-room 18 ft. by 14 ft., and a museum 24 ft. by 14 ft. The physiology department will, in addition, have a number of smaller rooms for private research. A practical room, 45 ft. by 22 ft., is also in the anatomy department, and a lecture-room, 20 ft. 4 in. by 14 ft., and a museum 38 ft. by 26 ft. It contains, further, a theatre, 27 ft. by 24 ft. This theatre will also be used by the lecturer in physiology, but the students in that department will enter by a separate corridor The botany and materia medica theatre, 26 ft. by 26 ft., is lighted from the east. A studio, dark-rooms, and storage-rooms are in each department in the main building. A small office is to the right of the entrance for the janitor. There are the usual preparation-rooms connected with all the departments. Lavatories and other conveniences are provided. The outer and inner halls and the corridors of the practical anatomy rooms are laid with wood-block flooring. The total cost of these buildings, which are two stories in height, is estimated at about 14,000*l.* Messrs. Gillespie & Scott are the architects. The contractors were:—Mason, Mr. Thomas Liddel, St. Andrews; joiner, Mr. Roderick M'Kenzie, St. Andrews; plasterer, Mr. Alexander M'Ritchie, Dundee; slaters, Messrs. Steele & Son, Dunfermline; plumber, Mr. William M'Leish, Perth; painter, Mr. David M'Gregor, St. Andrews; lift, Messrs. Westwood & Son, Dundee.

BUXTON ELECTRIC LIGHTING STATION.—The tender for the erection of the Buxton Electric Lighting Station, to be built on a site near to the present gas works, has been let to Mr. H. Vickers, of Nottingham. The plans have been prepared by Mr. W. R. Bryden, architect, of Buxton.

NEW BOARD SCHOOLS, DERBY.—The scheme for these schools, which have been erected in Pear-street for the Derby School Board, provides accommodation for 440 boys, 440 girls and 500 junior mixed, and 420 infants. There are three separate buildings with detached cookery and manual instruc-



New Board Schools, Derby.



New Board Schools, Derby.

SANITARY AND ENGINEERING NEWS.

PROPOSED BRIDGE, LINHOPE, NORTHUMBERLAND.—Owing to the frequent and high flooding of the River Breamish, making the existing means of access by the ford very dangerous, plans are now before the Northumberland County Council for the erection of a bridge. The freestone abutments will be built on the concrete foundations resting on the rock, and the girders will be of steel, and bowstring in design, with a corrugated iron flooring resting on steel cross girders, on which will be laid concrete and the road metal. The approach roads will have easy gradient and be properly fenced. The engineers are Messrs. D. Balfour & Son, of London and Newcastle.

SEWERAGE SCHEME, HERNE BAY.—Mr. G. W. Willcocks, M.Inst.C.E., attended, a few days ago, at the Council Offices, Herne Bay, to inquire into the applications of the Urban District Council to the Local Government Board to borrow 17,000*l.* for works of sewerage and 530*l.* for the purchase of land for a town depôt. The engineer to the scheme is Mr. Baldwin Latham.

MANCHESTER SHIP CANAL.—The engineer's half-yearly report as to works states that the dredging operations in the canal and docks have been carried on continuously during the last half-year, and the depth of the water has been fully maintained throughout. With regard to the quantities of sludge brought down by the rivers—some diminution appears to have taken place in the deposit in the docks at Manchester, though the quantities are still very large. No diminution can be detected in the quantities of sewage matter brought down by the Mersey and deposited in the coaling basin at Partington; the quantities of detritus brought down by that river and deposited near the weir at Irlam are also very large. At the site leased to the Smelting Corporation, near Ellesmere Port, the excavation for the laybye has been completed, and the wharf which is being constructed for the corporation is well advanced. The branch railway for the permanent connexion is in course of formation. At the bend at the Weaver mouth the navigable channel of the canal is being widened. A laybye, with a depth of 26 ft., is being formed by the removal of the rock in front of the wharf at Wigg's Works, at Runcorn, so as to provide for a development of the trade there. At the buildings for cold storage, erected at Mode Wheel by the Colonial Consignment and Distributing Company, the laybye and jetties have been completed and are ready for use. Special railway connexions have been formed, and the paving of the extension of Adamson-road is in hand and is nearly completed. At the grain elevator the special fire preventive works, ordered to meet the requirements of

tion schools. The buildings will face three sides of a square site, comprising about three acres of ground. The block now completed is for the infants and junior mixed departments, the infants occupying the ground floor and the "junior mixed" the first floor. The whole is planned with the idea of combining both the central hall and the corridor systems, the whole of the class-rooms being accessible from this central area. A left light has been adopted in all but two of the class-rooms. The two floors can be used as entirely separate schools, with their teachers'-rooms, lavatories, store-rooms, &c.; or, if desired, the two floors can be used in conjunction. All rooms and corridors have a dado of glazed brick, with sanitary angles, and are plastered above, woodwork being avoided as much as possible. The floors are in all cases fireproof, of concrete and iron construction in central halls and class-rooms, with pitch-pine boards secured to joists imbedded in the concrete; and in all lavatories and corridors they are of Rust's marble mosaics. The floors to class-rooms are all sloped instead of stepped, thereby avoiding tripping and a ledge for dirt. The heating is by low-pressure hot water, but all rooms are provided with open fireplaces in addition. The ventilation is by Messrs. Cousland & Mackay, and consists of inlets in the external walls and internal walls, and extracts in all ceilings connected by trunks, with exhaust ventilators on the roofs. Cross ventilation has been arranged in all rooms, so that the whole school can be well aired in the absence of the children. The fanlights over all internal doors work on the double louvre system. The lighting is at present by gas, the fittings being four-way pendants, but it is hoped that very shortly this will be superseded by electric light. The landings on staircases, which are of Hopton stone, are all protected by iron guards, 6 ft. 6 in. high. A lift from the basement is connected with both floors, for brushes, brooms, and coals, &c. Special cupboards are provided for dinner-baskets of children coming from a distance. Externally, the buildings are of red brick and terra-cotta, with Hopton stone sills to windows. The roofs are of slate. A plain, dignified appearance has been aimed at, with no suggestion of future dilapidation. The playgrounds are large, and asphalted, with good fall. Ample playsheds are provided, also drinking-fountains, and stones for pencil sharpening. The latrines are by Messrs. Doulton & Co., and these and the urinals are roofed with wired glazing, with ample provision for ventilation. The contractor for the work was Mr. A. Smith, of Derby, and the architects, Messrs. Naylor & Sale, also of Derby.

the fire insurance companies, are in hand. The large shed warehouse on the pier, between Nos. 6 and 7 Docks, is nearly complete, and is partially in use for traffic purposes. A wharf with railway connexions, road approaches, &c., is being constructed on the side of the approach to the Pomona Docks between the railway swing bridge and the Trafford-road swing bridge for the Manchester and Liverpool Transport Company, Limited. The old bank of the river opposite to the Cornbrook Wharf has been removed, and the operations required for the blasting and dredging of the rock under water at that place are in hand, so as to enable the wharf to be utilised for sea-borne traffic. Additional lines of railway have been laid down at and about the docks, and two new locomotive engines of a specially powerful type have been delivered and put to work. The eight new hydraulic cranes previously ordered have been erected and are now at work at the new shed-warehouse. The embankments and slopes of the canal generally are in good condition, and the works throughout the canal have been efficiently maintained.

PROPOSED PONTOON DOCK, ABERDEEN.—On Monday the Aberdeen Harbour Board authorised acceptance of an offer by Messrs. Clark & Standfield, patentees and contractors of patent docks, to supply and erect an off-shore single-sided pontoon dock, to accommodate vessels up to 425 tons dead weight, at the price of 7,250*l.*

SEWERAGE SCHEME, BILTON, HARROGATE.—The sewerage and sewage disposal scheme for Bilton, Harrogate, has just been completed by Mr. J. L. Hampton Matthews, contractor, of Harrogate, from plans prepared by Messrs. D. Balfour & Son, civil engineers, London and Newcastle. The main sewerage for Bilton comprises about 4,000 yards of 15 in., 12 in., and 9 in. diameter fireclay pipes laid at considerable depths and in rock-cutting, the whole being in straight lines, with manholes at all angles and changes of gradient. Automatic flushing chambers holding 1,000 gallons are provided at the head of all sewers, and ventilation is obtained by open manhole covers and cast-iron pipe shafts. The sewers have a minimum velocity of 3 ft. per second, and storm overflows only come into use when the quantity is eight times the normal sewage flow. The sewage is disposed on 9 acres of land on the broad irrigation principle, the effluent discharging into the River Nidd.

FOREIGN.

FRANCE.—The large and ugly building facing the Square Louvois, Paris, which was connected with the old opera house, is to be pulled down.——The Château of Chantilly will be open to the public again from April 1; on Sundays and Tuesdays free, on Saturdays at a charge of one franc.——The French Parliament has under consideration a proposal to establish a canal between the port of Marseilles and the Rhone, and thence with the general system of interior navigation. The cost is estimated at eighty million francs. The canal, which would start from Madrague basin, on the north side of the port of Marseilles, will be fifty-four kilomètres in length. It will connect with the Rhone at Bras-Mort, about ten kilomètres above Saint Louis.——The death is announced at the age of thirty-six, of M. Durand Tuhier, general secretary of the Société Nationale des Beaux-Arts, who for some years used to exhibit, under the pseudonym of "Paul Froment," landscapes which attracted a good deal of notice. He has left behind him an interesting manuscript relating to the life of Puvis de Chavannes.——The death is also announced of M. Eucher-Girardin, sculptor and pupil of M. Gauthier and M. Thomas, who exhibited in the Salon of 1893 a monument to some of the soldiers of 1870; that of M. Arthur de Gravillon, sculptor, Vice-President of the Société des Amis des Arts of Lyons; and that of M. Voulot, curator of the Departmental Museum of the Vosges, who died at the age of seventy at his residence at Epinal. M. Voulot had discovered and set up again the column at Portieux, and was the discoverer also of the mosaic at Grand, near Neufchatel. He was a member of the Society of Antiquaries of France, and author of various important archæological works, notably that under the title "Les Vosges avant l'histoire."

BULAWAYO.—At the Police Camp at Bulawayo a galvanised iron theatre has been constructed. The building is capable of seating about 300 persons. Its principal dimensions are a length of 56 ft., a breadth of 40 ft., and a height to the pitch of the roof of about 26 ft. The stage is 16 ft. deep by 28 ft. wide, leaving the auditorium nearly 40 ft. square, the latter being floored with pine. The architects are Messrs. Cummings & Brown, and the contractor Mr. Gerloff.

DECORATION OF ST. MICHAEL'S, WOOLWICH.—The first part of the scheme for the decoration of this church has just been completed. Five angels painted on canvas, after the style of Albert Dürer, have been placed above the large chancel arch, and the surrounding portion diapered in Indian red and finished at bottom with a border upon the yellow brick. The work was carried out by Messrs. Percy Bacon & Bros.

MISCELLANEOUS.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—It is announced that Mr. Henry Glenn, the sole proprietor of the Seyssel Asphalte Company, having died on the 1st inst., the business will be continued under the same general management, with the addition of Mr. G. F. Glenn, the only son of the late proprietor.——Messrs. W. B. Wilkinson & Co., Limited, concrete specialists, have removed their London offices from 15, Great George-street to No. 1, Victoria-street, Westminster, S.W.

APPOINTMENT.—Mr. Dennett H. Barry, F.S.I., has been appointed by the Benchers as Surveyor to the Honourable Society of Lincoln's Inn.

ABERDEEN GRANITE ASSOCIATION.—At the annual meeting of this Association Mr. A Wilson was re-elected President; Mr John Taylor, Vice-President; and Mr. James T. Jeffrey, Advocate, Secretary. It was resolved to decline to pay stonecutters' wages weekly instead of fortnightly as at present. A new scale of payment to granite polishers for night work was arranged.

NOTTINGHAM MASTER BUILDERS' ASSOCIATION.—The annual dinner of the Nottingham Master Builders' Association was held at the Albert Hotel on the 10th inst. Mr. Enoch Hind, a former President, occupied the chair, in the absence, through illness, of Mr. James Wright, the President. After dinner the customary loyal and patriotic toasts were honoured, after which Mr. Lewin submitted "The Mayor and Corporation of Nottingham." Alderman Pyatt responded. Mr. Vickers then gave "The Architects." Architects were the exponents of the greatest craft in the world, and to a certain extent they led the taste of the community amongst whom they lived. Beautiful buildings, buildings of noble proportions and clever construction, were as necessary to their education and their daily life as other beautiful things they saw around them day by day, and the more they could get of them the better it would be for their history, and better would be the record they would have to hand down to their children. In Nottingham they were somewhat behind other large towns in the matter of architecture. He was glad to add, however, that during the last few years there had been great improvement in this direction, and he sincerely trusted it would continue, and that the rising generation of architects, as they got larger practices, would be able to lead the people of the city to abandon that parsimonious spirit of spending as little money as possible on a building.—The Chairman then submitted "Success to the Master Builders' Association." He said the Association had been formed for only two or three years, but he was pleased to inform them that during the past year their membership had increased by thirty-one. They had had 140 meetings during the twelve months, and the members on the books to-day were ninety-nine. He hoped they would soon exceed one hundred. They were all aware that they had had some differences with the architects and with the men during the year. At its beginning there was a strike with the labourers, and, of course, the old song again—the bricklayers were in sympathy with them. There was only one result—the Association had to give way because work was good; but he was sure that, so long as they remained banded together, they would go on progressing, and not only progressing, but they would be even more successful in the undertakings of the future than they had been in the past.—Mr. George Fish responded, and observed that although the Association had had several difficulties to contend with they had been amicably overcome. They had met the bricklayers on several occasions, and the latter had met the masters in a fair spirit, and it was sincerely hoped that the plasterers' matter would eventually be settled without any deleterious issue.—Mr. Thomas Greenwood next submitted the "National Federation and Kindred Associations." He observed that the strength of the labour organisations was well known to all of them. If that strength were used for just and righteous purposes, for the promotion and the benefit of the conditions of the working classes, without injustice to the rest of the community, they would wish the men success. But when they saw those combinations not satisfied with their rights, but striving to injure the community in general, it was absolutely necessary for the welfare of the country that those who had the capital and the interest of the country at heart should combine. He referred more particularly to the advisability of unity in consideration of the action being taken in respect to the limitation of apprentices. In respect to the Federation, they had realised the great hopes of many. It was standing as firm as a rock.—Alderman Bowen, replying, dealt at some length with the work of the National Federation and the Midland Federation, over which he presided. Alderman Bowen remarked that they had not felt it to be their duty to carry on aggressive work against trade societies; they had aimed at greater things, such as obtaining proper forms of contract and better provisions generally. To protect their interests the Master Builders' Associations must take united action, and co-operate heartily one with the other. Mr. Ernest Jardine also returned thanks on behalf of the kindred associations. The remaining toasts were "The Visitors" and "The Chairman."

THE GLASGOW 1901 EXHIBITION.—At a meeting of the Chairman's Committee of the Glasgow 1901 International Exhibition, on the 8th inst., Mr. Hedley, the manager, was instructed to confirm the arrangement with Sir George H. Chubb for the formation of a London committee. It is understood that this step has not been taken in view of the opposition suggested by the Naval Exhibition, which it is proposed to hold in London in 1901, but simply to exert influence for the success of the Glasgow show.——A deputation from the Archæological Society waited upon the Parks Committee of Glasgow Corporation, on the 8th inst., and urged that the Kelvingrove House should not be removed, as had been proposed in connexion with the erection of buildings for the 1901 Exhibition. The Committee unanimously agreed to recommend to the Corporation that the old mansion should not be removed.

WORCESTER MASTER BUILDERS' ASSOCIATION.—The dinner of the Worcester Master Builders' Association was held on the 7th inst. Mr. J. Sharman Wood (President) presided. The toast list opened with the "Royal Family," after which Mr. J. Stokes proposed "The Mayor and Corporation of Worcester." Alderman Ernest Day, in response, congratulated the builders of Worcester on forming such a society, which would promote the trade of Worcester. He referred to the usefulness of such an association as that in helping them to avoid the distress and discomfort, and the severe suffering caused by strikes. Councillor Parker also replied. The Chairman next proposed "The Midland Branch of the National Building Trades Federation." The work of the Federation was one of defence, not defiance; and it was formed to defend the reasonable rights of the building employers. In defending their rights they were not only defending the rights of the builders but also of the public, because if there were to be any restrictions upon the hours or terms of labour, and if there was to be any advance in the wages, the money would have to indirectly come out of the pockets of the public, and therefore in protecting the reasonable rights of the builders the Federation was also protecting the public. The National Federation was divided into four branches which embraced the entire building interests of the kingdom. The Worcester Association had become affiliated to the Midland Branch. Although the Worcester Association was one of the most recent to join the branch, it was the intention of the Worcester builders to accord hearty loyalty and thorough support to the branch. It must not be thought that the Federation was started to act in defiance of the different building trades-unions, which had been the greatest possible advantage to the working classes, who owed their present position to unionism. There was a growing feeling amongst employers that some control should be placed upon the unions. When those unions attempted to restrict the number of apprentices, when the members refused to work with non-union men, when they dictated as to the hours of labour, and when they demanded an undue rate of wages, it became the duty of the master builders to unite and endeavour to stamp out the extreme course taken by the unions. The master builders of Worcester had not suffered a great deal, but in other places there had been great tyranny, and no one knew when such a thing would be experienced in Worcester, so that it was wise to be prepared.—He coupled with the toast the name of Ald. Bowen, who, in reply, contended that builders would not be in such a happy position but for the National Federation. The object of that Federation was not to grind down the workmen, but rather to uphold fairness between employers and employees. To builders circumstances had been such that the National Federation had had to take into consideration how it could best do its work in the interest of the members. While the workmen had been joined together they had been prone to dictate to the employers, demanding unwarrantable and extravagant wages. To the employers that was unsatisfactory; they wanted to be treated fairly and to treat their workmen fairly. In order to make the work of the Federation more effective efforts had recently been made to federate the whole of the branches in the country, and at the recent meeting in Bradford the outgoing president was able to state that federation embraced all the branches in the country. The Midland branches comprised the twelve central counties of England and the whole of North Wales.—Ald. Higgs proposed "Trade and Commerce," and Councillor Jones replied. Mr. J. Bromage gave "The Architects of Worcester." Mr. A. B. Rowe (of Messrs. Rowe & Son) returned thanks, and, after regretting his father's absence, complimented the Worcester builders on the formation of such an association. Speaking of strikes, Mr. Rowe said the architects were almost as much affected by strikes as the builders themselves. He hoped the Association would prosper, and that in a short time the strike clauses would not be necessary in contracts. Other toasts followed.

THE EAST END DWELLINGS COMPANY.—The annual report of this company states that a leasehold site, with frontages to Globe-road and other streets in Bethnal Green, has been acquired, and plans for building thereon have been approved, and building operations will be commenced as soon as possible. Considerable progress has been made with the new buildings fronting on Stepney Green which have been named "Dunstan Houses," and they will probably be ready for occupation early in

the summer. They will contain 161 lettable rooms, divided into tenements of one, two, and three rooms each, besides eight workshops. The large block of buildings known as "Ravenscroft," in Columbia-road, Bethnal Green, was opened for occupation in May, 1898, and not a single tenement was vacant at the close of the year, and the only shops unoccupied were three out of the twenty-four provided at Ravenscroft.

NEW CHANCEL SCREEN FOR THE PARISH CHURCH, LEAMINGTON.—A new chancel screen was dedicated on the 11th inst. The screen is of hammered wrought-iron, constructed from designs prepared by Sir Arthur Blomfield. It is about 26 ft. high, and surmounted by a Maltese cross 7 ft. high. The screen is the work of Messrs. Hart, Son, Peard, & Co., Limited.

THE BRITISH FIRE PREVENTION COMMITTEE.—The first official test under the auspices of the British Fire Prevention Committee took place at its testing station off Regent's Park on Wednesday afternoon at 3 p.m. The subject under investigation was a floor constructed by the Expanded Metal Company, Limited. Sir Arthur Blomfield attended to represent the Council, and among the ten representatives of the Committee were:—Messrs. Arthur M. Watson, District Surveyor, St. George's, Hanover-square; Bernard Dicksee, District Surveyor, East Newington; Benjamin Tabberer, District Surveyor, Greenwich; Frederick Hammond, District Surveyor, East Hampstead; and Edmund Woodthorpe, District Surveyor, Northern Division of the City of London. The test was conducted by a special sub-committee of the executive, comprising Mr. Max Clarke (directing member), Mr. Ellis Marsland, District Surveyor, Camberwell, and Mr. Charles E. Goad, with Mr. Edwin O. Sachs (Chairman of the Executive) and Mr. F. R. Farrow (Chairman of the commercial section) *ex officio*. Among the special visitors was the Technical Attaché of the German Embassy, Mr. H. Muthesius. The official illustrated report will be issued in due course.

WATERWORKS, FYLINGDALES, WHITBY.—The Rural District Council have approved of a scheme for the improvement of the existing waterworks for Fylingdales, recently agreed to be purchased from Sir Charles W. Strickland. The works comprise the providing of several miles of new water mains, the construction of filter beds and a large storage reservoir. The plans have been prepared by Messrs. D. Balfour & Son, civil engineers, London and Newcastle, who are submitting the same to the Local Government Board for sanction to a loan.

CAPITAL AND LABOUR.

THREATENED RUPTURE IN THE BARNSLEY BUILDING TRADE.—A lock-out of labourers is threatened in Barnsley. It seems that in September last the plasterers employed by Mr. T. Lindley, at the Theatre Royal, struck work because material required for the plastering of the theatre was being obtained from a firm who employed a man who had failed to pay a fine imposed by the National Union of Plasterers for some breach of rule. This was settled, but when the stoppage occurred one labourer had remained at work, and the Labourers' Union ordered him to pay a fine. He refused, and the other labourers would not resume work until he paid, and, as the plasterers cannot work without labourers, Mr. Lindley's shop has been standing idle since September. The Barnsley Building Trades Federation, having failed to obtain a settlement, have decided that, unless the objection to Mr. Lindley's shop is removed, the employers connected with the Federation will lock out all the trade-union labourers in their employ.—*Sheffield Telegraph.*

LEGAL.

POINT UNDER THE PUBLIC HEALTH ACT, 1875.

THE case of Robinson *v.* The Sunderland Corporation came before Justices Lawrance and Channell, sitting as a Divisional Court of Queen's Bench, on the 9th inst., on the appeal of Mr. Robinson from a decision of the Justices of the Borough of Sunderland. Proceedings were taken under Section 305 of the Public Health Act, 1875, authorising respondents to enter, examine, and lay open a certain house in the borough known as 31, East-street, for the purpose of making plans, surveying, and measuring, and making certain works. It appeared from the special case which had been stated that the respondents, acting under Section 36 of the Public Health Act, 1875, upon the report of their inspector of nuisances, had served notice upon the appellant requiring him to provide for his house a sufficient water-closet and an ashpit furnished with proper doors and coverings. This notice was not complied with, and the respondents determined to execute the works themselves. To do this it became necessary for them to enter, examine, and lay open the house for the purpose of making plans, surveying, measuring, and making the works. The respondents' Surveyor applied to the appellant for permission for the respondents to make such entry and examination for the purposes aforesaid, but the appellant refused such permission. The respondents then, after due notice to the appellant, applied to the Justices under Section 305 for an order authorising the necessary entry. At the hearing of the application evidence was tendered on behalf of the appellant as to the condition of his house and of the sufficiency of a privy and ashpit there. This evidence, however, was objected to by the respondents on the ground that the question of the sufficiency of the privy and ashpit was a matter to be decided by the respondents under Section 36 of the Public Health Act, 1875, subject only to appeal to the Local Government Board under Section 268, and that the respondents having jurisdiction under Section 36 to give the notice in question in this matter, the Justices could not review such notice, and were not entitled to receive evidence as to the sufficiency of the privy and ashpit. The Justices, being of opinion that they were not entitled to review the decision of the Local Authority as to the sufficiency of the privy and ashpit, declined to hear evidence thereon and made the order sought for. Hence the present appeal.

At the conclusion of the arguments of counsel their Lordships affirmed the decision of the Justices and dismissed the appeal.

Mr. Scott Fox, Q.C., and Mr. Adair Roche appeared as counsel for the appellant; and Mr. E. Tindal Atkinson, Q.C., and Mr. Manisty for the respondents, the Corporation.

INJURY TO BUILDINGS THROUGH CONSTRUCTION OF A TUNNEL AT ST. JOHN'S WOOD.

THE case of Lucas *v.* the Great Central Railway Company came before the Lord Chief Justice and a special jury in the Queen's Bench Division on the 9th inst. on an issue directed to be tried under the Railway Clauses Act, 1868, to ascertain what (if any) compensation should be paid to the plaintiff in respect of two houses, Nos. 10 and 12, Marlborough Hill, St. John's Wood, which, as he alleged, had been damaged by the construction of a tunnel by the railway company, the defendants.

It appeared that the plaintiff held the houses in question under a lease, the unexpired term being thirty-eight years. The houses were erected in the year 1838, and in 1870 were acquired by the plaintiff for 1,870*l.* Since that time he had spent about 1,000*l.* upon them in permanent repairs, and they yielded, prior to 1896, a profit rental of about 150*l.* a year. The plaintiff alleged that the houses were then worth between 2,400*l.* and 2,500*l.* The tunnel was commenced in May, 1896, and was completed in February, 1898. The tunnel runs under the roadway of Marlborough Hill, the crown of the arch being 23 ft. below the surface, and the front walls of the houses being about 60 ft. from the nearest point of the arch. The plaintiff alleged that since the tunnel was constructed cracks had developed in the walls of his houses and continued to develop up to the present time, and that these cracks were caused by the construction of the tunnel. He said that to remedy this state of things it would be necessary to underpin both the houses, and to execute other repairs, which would cost about 1,000*l.* The evidence called on behalf of the plaintiff was to the effect that the land for some distance from the tunnel had slipped in the direction of the tunnel, dislocating the gas and water mains under the roadway, and causing the roadway itself to subside, as well as injuring the plaintiff's and other houses.

The defendants' case was that the cracks in the plaintiff's houses existed before the tunnel was commenced, and that these had been widened in consequence of its construction, but that no underpinning was necessary to reinstate the buildings, and that the repairs could be executed for about 75*l.*

In the result the jury awarded the plaintiff 250*l.*

Judgment accordingly.

Mr. McCall, Q.C., and Mr. Alexander Glenn appeared for the plaintiff; and Mr. Littler, Q.C., and Mr. J. Eldon Bankes for the defendant company.

BUILDING DISPUTE AT DOVER.

THE hearing of the case of Cessford *v.* the Dover Harbour Board was concluded on the 3rd inst. in the Court of Appeal. The case came before the Court on cross appeals by plaintiff and defendants from the judgment of Mr. Justice Wills, sitting with a jury in the Queen's Bench Division. The facts are shortly as follows:—The plaintiff was the proprietor of the Esplanade Hotel at Dover, and the defendants were his landlords. Between the years 1865 and 1877 the plaintiff carried on a lodging-house on the premises then known as Nos. 17 and 18, Esplanade. In the year 1876 he entered into an agreement with the defendants for converting the premises into a family hotel, and in 1877 took a lease from the defendants for that purpose by which lease the defendants demised to him, *inter alia*, all ways, lights, easements, and appurtenances belonging to the premises. The defendants, in the year 1892, commenced under statutory powers, to erect a new harbour, and during the course of its construction the plaintiff alleged that in so doing the defendants had caused a serious nuisance to him and damaged him in his business by interfering with the free access to the hotel, blocking the views from his windows, putting up a staging with a travelling crane and steam engine, from which some of the bedroom windows were overlooked by workmen, making and storing concrete cement blocks, laying down rails on which locomotives were employed, and causing by their working dust, smoke, and noise. The plaintiff alleged that these acts of the defendants violated their implied covenant for quiet enjoyment, and claimed damages and an injunction, or alternatively damages in respect of the acts complained of and the threatened continuance thereof. The defendants mainly relied on their statutory powers, under which the works were executed. Mr. Justice Wills gave judgment for the plaintiff for 200*l.* in respect of that part of the acts complained of, which consisted of the defendants storing and unstoring cement in a cement shed at the back of the hotel, being of opinion that the defendants had been negligent in the way in which they did that part of the work. With regard to the rest of the acts complained of, however, he held that the defendants were protected by their statutory powers. The plaintiff now appealed from this decision, and asked for judgment for 800*l.*, the verdict of the jury. The defendants aiso gave notice of cross appeal.

At the conclusion of the arguments of counsel their lordships (the Lords Justices) held that the defendants had power to make certain subsidiary works within the limits of deviation shown on the deposited plans, and that therefore the plaintiff could not claim compensation under Section 11 of the Lands Clauses Act, 1845, and that the works complained of in front of the plaintiff's hotel came within the description of work in that section, and that the evidence showed that the works were all proper and ordinary works usual in such a case. Upon this point, therefore, the judgment of Mr. Justice Wills was affirmed. They held, however, that the plaintiff had not only the right to complain of the negligent use of the cement store at the back of the hotel by the defendants, but he had a right to complain of the defendants using the store at all. The damages, therefore, should have been based upon that view. Their lordships increased the damages to the plaintiff on this head to 350*l.*, but gave no costs of the appeal.

Order accordingly.

Mr. Dickens, Q.C., and Mr. F. M. Abrahams appeared for the plaintiff; and Mr. Lawson Walton, Q.C., and Mr. J. Eldon Banks for the defendants.

CLAIM FOR BUILDING MATERIALS.

IN the Westminster County Court, on Friday last week, his Honour, Judge Lumley Smith, Q.C., had before him the case of Paxton *v.* Cohen by way of a remitted action from the High Court, in which the plaintiff, a dealer in building materials and hardware goods, sued the defendant, a builder and contractor of Friars-place, Acton, to recover the sum of 67*l.* 10s. in respect of lavatory fittings, stoves, and other goods, supplied to the order of the defendant.

The original action was brought by Mr. Ward, who was appointed Official Receiver of plaintiff's estate, and was remitted from the High Court to the County Court for the purpose of several disputed items in the account being gone into.

The defendant had paid 43*l.* into Court, and the plaintiff's claim as to the balance was admitted, subject to counter-claim. It was not disputed that the whole of the goods mentioned in the account had been duly delivered, but the defendant's case was that in reference to several important articles they were not in accordance with the orders given.

Mr. James D. Cohen was called, and said he was engaged in building an estate at Friars-place, Acton, and in the ordinary course of business he gave the plaintiff orders for a quantity of tiling, lavatory-fittings, and stoves. He had paid into Court a sufficient sum to pay for the goods which were according to order, but he disputed the balance on the ground that some of the lavatory fittings were not of the proper pattern and size, whilst a kitchen stove, which was to have patent dampers, was not in accordance with the order, and was quite useless for the purpose for which it was required. He admitted, however, that the stove in question had been duly fixed in the house.

His Honour, after going into the items at some length, said it might be that the goods were not quite to the defendant's order, but, at any rate, he had made use of them. On the whole he (the Judge) did not think the sum paid into Court was sufficient, and, therefore, judgment would be for the plaintiff for 10*l.* beyond that sum, and costs.

IMPORTANT APPLICATION AGAINST THE LONDON COUNTY COUNCIL IN THE CHANCERY DIVISION.

THE case of Bayley & Co. *v.* The London County Council came before Mr. Justice Romer in the Chancery Division of the High Court of Justice on Saturday, the 11th inst., on a motion by the plaintiffs for an *interim* injunction till the trial to restrain the defendants, the London County Council, from trespassing on the plaintiffs' premises, No. 13, Warwick-street, and from interfering with the party-wall, &c.

Mr. Henderson appeared in support of the motion, and Mr. Kenyon Parker for the defendants.

Mr. Henderson explained that the action was one which had been assigned to Mr. Justice North.

Mr. Parker said that his clients had only got the affidavits that morning, and he should like an adjournment so as to have an opportunity of

answering them. His clients' architect was out of town, but he was instructed that no further interference with the plaintiffs' premises would take place.

His Lordship: Will you undertake not to do any further act in the meantime?

Mr. Parker said he could not do that.

Mr. Henderson. I must press for the injunction, because the evidence is that the defendants are going on with the work. I understand that their architect has gone away to Wales in connexion with some water scheme, and I want protection meanwhile.

His Lordship: You want an injunction to restrain them from dealing with the party wall?

Mr. Henderson: Yes. If the defendants are not going to do anything further the injunction will not hurt them.

His Lordship: You are not asking for a mandatory injunction?

Mr. Henderson: No. I am not asking for that now.

His Lordship: Ought you not, Mr. Parker, to give an undertaking not to futher interfere with the wall till the trial?

Mr. Parker: There is always a difficulty in a Corporation undertaking. I am told that everything is done that will be done.

Mr. Henderson: That is not in evidence.

His Lordship (to Mr. Henderson): What do you say they are doing?

Mr. Henderson: I say that they are going on with this work—pulling down the house next to ours and that they have taken away our support, the consequence being that our house has gone away from the perpendicular.

His Lordship: One ought to be very careful in a case of this kind. I do not know what injunction to grant, because if I grant an injunction restraining them from interfering with the wall they could not shore it up or anything like it.

Mr. Henderson: Well, I should like an injunction to restrain them from doing anything further.

His Lordship: Yes, but that might prevent the defendants from going to shore the wall up.

Mr. Henderson: Will your lordship grant an injunction to prevent them from interfering with our right to support? I should be content with that. I am entitled to it because the evidence shows that they are going on with the work and pulling down the support which keeps my building upright. I do not see why my learned friend could not give an undertaking in that form.

Mr. Parker: I am instructed to say that I should not object to an injunction in that form.

His Lordship: Very well.

Mr. Parker: So long as it is understood that if I want to shore up the wall I shall not be prevented.

His Lordship (to Mr. Henderson): Very well. Take an injunction in that form till the 17th inst.

Order accordingly.

THE EXPENSES OF PAVING A NEW STREET.

THE case of Wix and others *v.* Rutson, which came before Mr. Justice Bruce, sitting without a jury, in the Queen's Bench Division, on the 13th inst., raised the question as to which of two parties, viz., the landlord or tenant, was liable for an assessment for the expenses of paving a new street. It appeared that the defendant was assignee of a lease, dated March, 1882, whereby the plaintiff's predecessor in title demised to a Mr. J. T. Bonner certain land in Wandsworth for a term of twenty-one years. This lease, which was determinable by a six months' notice, contained a covenant by Mr. Bonner, for himself and his assigns, to bear, pay, and discharge during the term all taxes, charges, rates, duties, tithe and tithe-rent charges, assessments, and impositions upon the premises which might at any time during the term be imposed on the premises, or upon the landlord or tenant in respect thereof (the landlord's property tax only excepted). In April, 1898, notice was given by the plaintiffs to determine the tenancy, and in May, 1898, the plaintiffs entered into an agreement to sell the property. In June, 1898, the Wandsworth Board of Works gave the owners of the property notice of the apportionment of the sum of 122*l.* 6*s.* 7*d.* for the expenses of paving a new street on which the premises abutted, but the notice fixed no date for payment. In July the plaintiffs paid the sum due. In February, 1899, or five months after the tenancy had determined, the works were commenced and the plaintiffs now sought repayment of the amount of the assessment on the ground that the sum was a charge or duty imposed on the landlord in respect of the premises. The defendant, however, contended that the notice served by the Local Board was not a demand under Section 96 of the Metropolis Management Act, 1862, but was only an estimated apportionment, and not taxed, rated, assessed, or imposed upon the premises within the meaning of the covenant sued upon.

Mr. Justice Bruce held that, although the case was one of apparent hardship on the tenant, he could not find any valid reason for exempting the defendant from the burden of the covenant which had been entered into and gave judgment for the plaintiffs for the amount claimed with costs.

Mr. George Wallace appeared as counsel for the plaintiffs, and Mr. H. L. Manby for the defendant.

ACTION BY THE LEEDS CORPORATION TO RECOVER EXPENSES OF PAVING A NEW STREET.

THE case of the Lord Mayor of Leeds *v.* Armitage came before Justices Lawrance and Channell, sitting as a Divisional Court of Queen's Bench, on the 14th inst., on the plaintiff's appeal from the judgment of the County Court Judge of Leeds, who gave judgment for the defendant in an action by the Corporation of Leeds for the expenses of paving executed by them.

It appeared that certain flagging, channelling, and paving were required to be done in Brookfield-road, Leeds. A notice was served in May, 1896, on the owners to execute the work, stating that in case of default for two months, the Corporation would do the work and charge them therewith. Through an error, no notice was served upon the owner of the property of which the defendant became the owner in September, 1896, and the Corporation began the work, and the flagging and channelling was finished on March 24, 1897, but the paving did not quite reach the defendant's land. On that day the defendant visited the ground, and upon his going to the Highway Department and asking on what authority the work was done, he was served with a copy of the old notice. The work was stopped for two months to enable the defendant to do the paving, but as he did nothing the Corporation did it and made an apportionment of the expense, and charged the defendant with the cost of the paving which had been done after the notice, and the action was brought to recover this amount. The County Court Judge, however, found that there had been no service of the order of the Corporation to do the work within the meaning of and in accordance with the Corporation's private Act of Parliament so as to found the proceedings, and gave judgment for the defendant. Hence the present appeal.

Their Lordships affirmed the judgment of the County Court Judge, and dismissed the appeal with costs.

Mr. Geo. Banks appeared for the Corporation; and Mr. J. A. Compston for the defendant.

MEETINGS.

FRIDAY, FEBRUARY 17.

Architectural Association.—Mr. Cole A. Adams on "Colour Decoration." 7.30 p.m.

Glasgow and West of Scotland Technical College (Architectural Craftsman's Society). — "Notes on Building Materials," by Messrs. R. W. Horn and A. Davie.

SATURDAY, FEBRUARY 18.

Architectural Association.—Spring Visit to the Roman Catholic Cathedral, Ashley Gardens, Victoria-street, Westminster, by permission of the architect, Mr. J. F. Bentley. 3 p.m.

South Kensington Museum (Lecture Theatre).—Mr. J. H. Pollen, M.A., on "Furniture." II. 3.30 p.m.

Royal Institution.—The Right Hon. Lord Rayleigh on "The Mechanical Properties of Bodies." II. 3 p.m.

Perth Architectural Association. — Visit to Wilson U.P. Church, New Scott-street. 2.30 p.m.

MONDAY, FEBRUARY 20.

Royal Institute of British Architects.—Messrs. J. M. Brydon and F. J. Burgoyne on "Municipal and Public Libraries." 8 p.m.

Royal Academy.—Lectures on "Greek Sculpture," by Dr. A. S. Murray. I.—"The Niobides in Florence." 4 p.m.

Surveyors' Institution.—Mr. J. L. Crouch on "The Management and Valuation of Brickfields." 8 p.m.

Carpenters' Hall, London Wall (Free Lectures on Matters connected with Building). — Professor Roger Smith on "Terra-cotta—its Nature, History, and Use in Former Times, and at the Present Day." 8 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Introductory Lecture, by Professor W. H. Corfield. 8 p.m.

Liverpool Architectural Society.—Professor F. M. Simpson on "Some Burgundian Churches." 6 p.m.

Leeds and Yorkshire Architectural Society.—Professor Goodman on "Steel Construction in Buildings." 6.30 p.m.

TUESDAY, FEBRUARY 21.

Institution of Civil Engineers.—Paper to be further discussed, "The Lake Superior Iron Ore Mines, and their Influence upon the Production of Iron and Steel," by Mr. Jeremiah Head. 8 p.m.

Northampton Institute, Clerkenwell. — Lectures on Mediæval Architecture, by Mr. Francis Bond, M.A. VII. —"Travels of the Dome." 7.45 p.m.

Society of Arts (Applied Art Section).—Mr. Cyril Davenport on "Vitreous Enamels." 8 p.m.

WEDNESDAY, FEBRUARY 22.

Society of Arts.—Mr. Philip Dawson on "Electric Traction, and its Application to Railway Work." 8 p.m.

Liverpool Engineering Society.—Mr. G. C. Aitchison on "Snowdon Mountain Railway." 8 p.m.

THURSDAY, FEBRUARY 23.

Royal Academy.—Lectures on Greek Sculpture, by Dr. A. S. Murray. II.—"The Nereids in the British Museum." 4 p.m.

Society of Antiquaries.—8.30 p.m.

London Institution.—The Rev. Canon Benham on "Winchester Cathedral." 6 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Dr. Herbert Manley on "Sanitary Law: English, Scotch, and Irish; General Enactments Public Health Act, 1895; Model By-laws, &c." 8 p.m.

FRIDAY, FEBRUARY 24.

Institution of Civil Engineers (Students' Meeting).—Mr. R. Gordon Mackay on "The Loss of Heat from Buildings." 8 p.m.

SATURDAY, FEBRUARY 25.

Lecture Theatre, South Kensington Museum —Mr. William Burton on "Pottery." I. 3.30 p.m.

Royal Institution.—The Right Hon. Lord Rayleigh on "The Mechanical Properties of Bodies." III. 3 p.m.

Builders' Foremen and Clerks of Works' Institution.—Annual dinner, King's Hall, Holborn Restaurant. 6 p.m.

Sanitary Institute.—Inspection and Demonstration for Sanitary Officers at the Aylesbury Dairy Company's premises, St. Petersburg-place, Bayswater. 3 p.m.

RECENT PATENTS:

ACCEPTED SPECIFICATIONS.

Open to Opposition until April 8.

[1897] 28,310, Tickle, Terra-cotta and Earthenware Goods. 30,811, Campbell, Treatment of Metal for Roofing, and for Inside and Outside Wall Purposes. [1898] 2,524, Brookes, Ratchet Braces. 2,885, Pinnock, Taps or Valves. 3,179, Hattersley, Ratchet Brace and Portable Drilling Mechanism. 3,376, Wright, Building Blocks, Bricks, &c. 3,447, Reynolds & Astley, Feed for Supplying Oil to Burners in Controlled Quantities. 3,799, Jürgen, Automatical Gas-Ignition. 3,850, Geipel, Lange, & Gattrick, Holders for Glow-Lamps. 3,864, Bousfield, Sliding-door Rollers. 4,260, Hutcheson & Service, Fire-Bricks and Mortars or Cements. 4,902, Parkinson, Coin-Freed Gas-Meters. 6,243, Rooney, Combined Square and Protractor. 6,385, Turner, Hearth-Plates, Tiles, &c. 6,588, Siddle, Solder. 6,655. Wilford, Workmen's Tool-Bag. 6,990, Weston, Electrical Measuring Instruments. 7,500, Hanman, Brushes. 7,751, La Soc. Guyenet et de Mocomble, Lifts Worked by Electricity with Hydraulic Braking Apparatus. 7,686, Richmond, Gas Meters. 7,842, Kirkland, Heating and Cooling Apparatus, more especially for use in Hospital and other buildings. 8,155, The Metal Tube Jointing Company & Palmiter, Expanding the Ends of Tubes in Sockets of T-pieces, &c. 8,180, Redman, Window Fasteners. 8,306, Oliphant, Water Heaters. 8,697, Green, Cranes, &c. 9,276, Wade, Automatical Delivery of Disinfectants to Flush-water. 10,224, Stöger, Roofing Tile. 11,522, Sanderson, Treatment of White Lead. 14,974, Knopfe, Scaffolding. 15,496, Browne & Martineau, Electrical Time Switches. 16,743, Breslauer, Keyless Locks. 20,756, Schultze, Incandescent Burners or Lamps. 20,760, Coombs, Pavements and Conduits. 21,848, Grove, Wrenches. 23,071, Stoop, Paint, &c. 23,394, Smith, Saw Handles. 23,802, Capitaine, Portable Drilling Apparatus. 24,151, Brassington & Brassington, House and other Ventilators. 25,750, Barnikel, Time Apparatus for Gas Extinction. 26,222, Wolz, Convertible Furniture. 26,314, Stevens, Window Sash Locks. 26,846, Green, Clamping Devices Applicable to Vices, Wrenches, Presses, &c. 27,155, Young, Interceptors for Sewer Drains. 27,353, Duffy, Cross-cut Sawing Machines. 27,563, Jones, Method of Attaching the Heads of Brushes, Brooms, &c., to their Handles or Shafts.

ABSTRACTS OF PATENTED INVENTIONS.

22,781.—CHIMNEY-CLEANING: *A. Messenger.* — The apparatus (for domestic use) consists of a windlass to be brought to the fire-place, and a pulley at the top of the chimney from which hangs a wire rope; in operation, a brush is attached to one limb of the rope, and the two rope-ends are fastened to two other ropes wound, oppositely, upon the windlass, whose frame has a vertical plate for preventing escape of soot into the room.

22,784.—WINDOW SASHES: *J. Matthew & J. T. Buckley.*—The sashes of the windows, divided vertically, slide upon horizontal rails and so pass into recesses within the walls at either side; friction is reduced by means of pulleys, whilst the rails are sloped towards the sill for carrying away moisture, and are furnished with guide-ribs or channels.

22,792.—PAINTS AND VARNISHES: *L. Hunt.*—For a white paint or varnish that shall be permanent, the inventor grinds a mixture of barium sulphate and zinc sulphite in oil, and then thins it with copal varnish or oils and driers.

22,805.—CASTING PLASTER CORNICES, &C.: *A. Carlewitz.*—A metal frame holds the pattern, into which soft clay is pressed, in order to fill the cavities, depressions, &c., to a uniform depth. Thus the clay back follows, roughly, the design's configuration. A plaster backing is next cast in the frame, which, when the plaster becomes set, is removed. Then the backing is detached from the clay, and the latter from the pattern. A flexible composition of gelatine and glycerine mixed with chalk, resin, and turpentine is poured through holes drilled in the plaster backing into the space where the clay had been and into the holes. The composition is allowed to become set. On removal of the pattern and inversion of the mould, the plaster cornice is found cast in inverted relief upon the elastic base. The backing is then removed from the elastic base, which may be stripped from the plaster without injury, and may serve again.

22,826.—TRIPOD STANDS FOR LEVELS, THEODOLITES, TELESCOPES, &C.: *M. Leithoff & A. Hein.*—The partly spherical head on which the instrument is mounted is cut away in order that it may allow the free passage of a bridge adapted to carry a centre point, and secured to the cylinder upon the tripod stand; the pendulum hangs from a ring which is fixed to the head, and a ring which embraces the head's rounded portion is screwed upon the top of the cylinder. Thus the parts can freely swing until the pendulum remains in a vertical position, when the ring is screwed down and so clamps the head.

22,827. — PIPE JOINTS: *E. Box.*—One end, or both ends, of the pipe are slit down by saw cuts and then expanded into a sleeve by either the taper ends of the pipes or internal ferrules; the joints may be of various kinds—*e.g.*, with the pipes, cut as above, expanded into a sleeve by ferrules; with a separate ferrule instead of a tapered pipe-end; or with one pipe slit and the other tapered to form an internal ferrule.

22,837—DRAIN AND SEWER PIPES: *E. A. S. Fawcett.* —Discs for closing branch inlets are made in one piece with the pipe and are notched around their circumferences so that connexions can afterwards be made by breaking off the disc; a separate disc also may be seated in an extension of the socket.

22,841.—SPANNERS: *F. S. Smith.* — A worm which engages with teeth upon the stem connects the sliding jaw to the stem, being mounted upon a shaft which is pressed towards the stem by means of springs; adjustment of the jaw is effected by turning the worm or by sliding the jaw when the worm has been pulled out of gearing with the teeth.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
*Concrete Hall, Reading Room and Lavatories	Ramsgate Corp.	50*l.*; 20*l.*; and 10*l.*	April 30
*Market Hall and Shops	Leeds Corp.	150*l.*; 100*l.*; and 50*l.*	June 1
*Vagrant Wards	Hexham Union	20*l.*	No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
*Australian Hard Wood Blocks	Camberwell Vestry	W. Oxtoby, Vestry Hall	Feb. 20
Business Premises, Silver-st. Stockton-on-Tees	Hill & Co.	E. E. Clephan, Archt., St. Nicholas-chmbrs. Newcastle-on-Tyne	Feb. 21
House and Surgery, Wincobank	Dr. J. Milne	G. A. Wilson, Archt. Hartshead-chmbrs. Sheffield	do.
Street Works, Elgin, N.B.	———	A. A. Turriff, Burgh Surv. Elgin	do.
Asphalting Footpaths, Seedley Park, Pendleton	Salford Corp.	S. Brown, Town Hall, Salford	do.
Two Houses, Lansdowne-rd. Bridlington Quay	Trustees of R. Harrison	S. Dyer, Archt. Bridlington Quay	do.
Sewers, St. John's-avenue East, Bridlington	———	do.	do.
Sewerage Works	Staines U.D.C.	J. C. Mellis, 244, Gresham House, Old Broad-street, E.C.	do.
Road Works	Cardiff Corp.	W. Harpur, C.E. Town Hall	do.
Five Houses, Lancaster-road, Morecambe	J. Rond	Marshall Bros. Archt. Back-crescent, Morecambe	do.
Surgery, &c. 94, Manchester-rd. Bury	Lancs. & Yorks. Ry. Co.	H. Shelmerdine, Archt. Hunt's Bank, Manchester	do.
Station Buildings, Rose Grove	do.	Engineer, Hunt's Bank, Manchester	do.
Forty Houses	Kilkenny Corp.	W. K. Cleere, Kilkenny	do.
Sewerage Works, Earl-street	Ramsbottom (Lancs.) U.D.C.	J. W. Barlow, Market-pl. Ramsbottom	Feb. 22
Road Works	Ilkley U.D.C.	Surveyor, Council's Offices	do.
Additions to Asylum, Rainhill	Lancashire Asylum Board	J. Gornall, The Asylum, Rainhill	do.
Footbridge, Elton	Bury (Lancs.) Corp.	Borough Engr. Bank-st. Bury	do.
Sewers	Saltcoats (N.B.) Burgh Commrs.	J. & H. V. Eglesham, C.E. Ayr	do.
*Works and Materials	Hackney Vestry	J. Lovegrove, Town Hall, Hackney, N.E.	do.
*Three Glazed Earthenware Urinals	St George-in-the-East Vestry	Surv. Vestry Hall, Cable-street, E.C.	Feb. 23
Alterations to Stabling, Nile-road, New Brompton	Southend Corp.	E. J. Hammond, Archt. 111, High-st. New Brompton	do.
Chapel and Lodge, Sutton-road	———	A. Fidler, C.E. Clarence-road, Southend	do.
Waterworks	Aberystwith R.D.C.	G. Jones & Son, Aberystwith	Feb. 24
Road Metal	Bedford C.C.	County Surv. Shire Hall, Bedford	Feb. 25
Stone Bridge, Hovingham, near Malton	———	W. Stead, C.E. Northallerton	do.
Electric Light Buildings	Burton-on-Trent Corp.	F. L. Ramsden, Engr. Town Hall, Burton-on-Trent	do.
House and Two Shops, Nursery, Bradford	———	S. Spencer, Archt. 344, Great Horton-road, Great Horton	do.
Wall, Station-road	Keswick U.D.C.	W. Hodgson, Surv. Town Hall	do.
Sewers	St. Annes-on-Sea U.D.C.	H. Bancroft, C.E. 88, Mosley-st. Manchester	do.
House and Shop, Ashton, Breage, Cornwall	———	Mrs. L. J. Eustice, Ashton, Breage	do.
Additions to Tregarthen's Hotel, Scilly	———	O. Caldwell, Archt. Penzance	do.
Road Materials	East Sussex C.C.	F. J. Wood, C.E. County Hall, Lewes	do.
Residence, Station-rd. Masborough	Dr. E. E. Dufty	G. H. Johnson, Archt. 38, High-st. Rotherham	Feb. 27
Additions to Schools, Middleforth, Preston	———	Mr. Swindells, 3, Cannon-st. Preston	do.
Bridge, Patterdale	———	J. Bintley, Surv. 7, Lowther-st. Kendal	do.
Reservoir	Merthyr Tydfil U.D.C.	T. F. Harvey, Engr. Town Hall	do.
Street Works	Wolverhampton Corp.	J. W. Bradley, C.E. Town Hall	do.
Alterations to Schools, Silver Hill	Hastings U.D. Sch. Bd.	Elworthy & Son, Archts. London-rd. St. Leonards	do.
Additions to No. 18, Wellington-sq.	do.	A. Dray, Archt. Town Hall-chambers, Hastings	do.
Police Station, Woodhouse	———	City Engineer, Municipal Offices, Leeds	do.
Extension of Weaving Sheds, Earlsheaton	———	F. W. Ridgway, Archt. Dewsbury	do.
*Iron Fencing and Gates	Ilford U.D.C.	H. Shaw, 7, Cranbrook-rd. Ilford, E.	Feb.
*Street Works	Cty. Boro. of West Ham	Lewis Angell, Town Hall, West Ham, E.	do.
Additions to Schools	Sheffield Sch. Bd.	C. J. Innocent, Archt. 22, High-st. Sheffield	do.
Waterworks	Wakefield Corp.	C. H. Smith, C.E. Town Hall	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered
Branch Stores, Alfred-rd.	Brightside, &c. Co-op. Soc.	H. Webster, Archt. Norfolk-row, Sheffield	Feb. 28
Flint Road Metal	Dover T.C.	E. W. Knocker, Castle Hill House, Dover	do.
Rebuilding Bridge, St. John's-road	Buxton U.D.C.	J. Taylor, Town Hall	do.
*Works and Materials (various)	Lewisham B. of W.	Town Hall, Catford, S.E.	do
*Road Works, &c. Tyrwhitt-road, Lewisham	do.	Surv.'s Dept. Town Hall, Catford, S.E.	do.
*Road Works, &c. Ringstead-road, Catford	do.	do.	do.
*Drainage Works	Willesden D.C.	O. C. Robson, Public Offices, Dyne-road, Kilburn	do.
Store Buildings	Portsea Union	G. C. V. Inapen, Archr. Whittington-chambers, Southsea	Mar. 1
Road Works	Clacton-on-Sea U.D.C.	A. B. Robinson, Surv. Town Hall-buildings	do.
Storage Reservoir	Llanidloes T.C.	F. Beesley & Son, Engr. 11, Victoria-st. S.W.	do.
*Infirmary at Workhouse	Congleton Union	Master at Workhouse, Arclid	do.
*Blue Guernsey Granite	Bethnal Green Vestry	F. W. Barratt, Vestry Hall, Church-row, Bethnal Green, E.	Mar. 2
Alterations to Houses, Gt. George-st. Leeds	———	Smith & Tweedale, Archt. 12, South Parade, Leeds	Mar. 3
Drainage Works	Uxbridge R.D.C.	J. Anstie, C.E. 10, Marchwood-crescent, Ealing	do.
Bridges	Sheffield Corp.	C. F. Wike, C.E. Town Hall	Mar. 4
Bridge, Buckie, N.B.	Commissioners	J. Barron, C.E. 1, Bon Accord st. Aberdeen	do.
*Services and Materials (various)	Bermondsey Vestry	F. Ryall, Town Hall, Spa-road, S.E.	do.
*Chimney Stack	Edinburgh and Leith Gas Commrs.	W. R. Herring, Gasworks, Edinburgh	do.
Hospital Buildings	Tiverton Hospital Board	J. Siddals, Tiverton	Mar. 6
Road Works	Belford R.D.C.	A. J. Ware, Surv. Belford, Northumberland	do.
Schools, Thornaby-on-Tees	Canon Shanahan	E. Goldie, Archt. 31, Upper Phillimore-place, W.	do.
Hartshill Stone (3,115 tons)	Abingdon R.D.C.	B. & E. M. Challenor, 59, St-ert-st. Abingdon	do.
*Art c'es, Works, &c.	Rotherhithe Vestry	J. J. Stokes, Vestry Hall, Lower-rd. Rotherhithe	do.
*Sorting Office, Putney, S.W.	Commrs. H.M. Works	Office, Storey's Gate, Westminster	do.
*Materials (various)	Fulham Vestry	Town Hall, Walham Green, S.W.	Mar. 8
*Works, Materials, &c.	Bath U.S.A.	C. R. Fortune, Guildhall, Bath	Mar. 14
*Construction of Wells and Supply of Plant, &c.	Poplar Union	E. J. Warden Stevens, 34, Victoria-st. S.W.	Mar. 17
*Superstructure of Lunatic Asylum	Kesteven County Asylum	G. T. Hine, 35, Parliament-st. S.W.	April
*Materials (various)	Camberwell Vestry	W. Oxtoby, Vestry Hall, Peckham-road, S.E.	See advt.
Residence, Pocklington	R. M. English	W. Thorp, Archt. 22A, Commercial-st. Leeds	No date
School, Richmond, Yorks.	———	Clark & Moscrop, Archt. Feetham's, Darlington	do.
Restoration of Church, Thwing	———	T. Moore, Archt. 46, Wellwalk, Hampstead, N.W.	do.
Mill Buildings, Hull	Storry, Smithson & Co.	Brodrick & Co. Archts. 77, Lowgate, Hull	do.
Alterations, &c. Industrial School, Halstead	———	Baker & May, Archts. Colchester	do.
House and Shop, High-st. Manningtree	———	H. Spooner, South-street, Manningtree	do.
House, Caramore, Ireland	———	J. Armstrong, Canal House, Tullamore, King's County	do.
Inn, Bolton-rd. Bradford	———	J. Jackson, Archt. Barry-st. Bradford	do.
Sanatorium, Baguley Lodge, Cheshire	Withington U.D.C.	J. Broadbent, Archt. 15, Cooper-st. Manchester	do.
Sewerage Works	Keighley Corp.	W. H. Hopkinson, C.E. Keighley	do.
Three Houses, Higham Ferrers	———	H. Adnitt, Archt. High-st. Rushden	do.
Alterations to Premises, Derby-road, Skegness	———	C. N. Holloway, Archt. Angel-row, Nottingham	do.
School	Aske's Haberdashers' Schools	Widnell & Trollope, 20, Tothill-st. S.W.	[dr.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in.
*Clerk of Works	Fulham Vestry	37. 3s. per week	Feb. 25
*Corresponding and Shorthand Clerk	St. Marylebone Vestry	100*l.* per annum	do.
*Road Ganger	Tottenham U.D.C.	35s. rising to 42s. per week	Feb. 28
*Building Inspector	Southend-on-Sea Corp.	125*l.* per annum	Mar. 3
*Clerk of Works	Edmonton U.D.C.	37. 3s. per week	Mar. 6
*Surveyor	Westminster Union	See advt.	Mar. 10
*City Engineer	Municipality of Calcutta	1,800 Rupees per month	See advt.
*Engineering Assistant	Southport Corp.	150*l.* per annum	No date

Those marked with an asterisk (*) are advertised in this Number. Competitions, p. iv. *Contracts, pp.* iv. vi. viii. x. & xxi. *Public Appointments, pp.* xviii. & xxi.

22,867.—PRESERVATIVE COMPOSITIONS: *H. L. Bates.*—For coating metal, canvas, and similar materials, is made an admixture of acetic acid, powdered borax, carbonate of soda, glucose, paraffin wax, citronella, salt, alum, nitre, and white grape juice.

23,026.—APPARATUS FOR CUTTING DOVETAILS: *J. R. Rickard.*—The contrivance is devised as an attachment for the dovetailing machines specified under No. 1,124 of 1895 and No. 1,732 of 1896; for cutting lapped dovetails, the lower end of the vertical spindle carries the cutter—a belt and its guide-pulley rotating the spindle, which is carried by a bracket traversed by a crank through a range limited by stops. When the work is put under the vertical cutter upon the spindle, and the cutter is traversed first on one side of the dovetail and then on the other side, the rounded corners left by the ordinary rotating cutter in lapped dovetails are cut out.

23,059.—WINDOW BLINDS: *J. Hempstalk.*—Flexible straps connect the blind laths in which elongated holes engage with hanging guide-rods, on each lath is a pair of metal springs which pass through slots in the other laths to wind round pulleys that run on a shaft at the top; the blind may be held in any position by the pressure of collars against the pulleys, and by pulling a cord that hangs from a pivotted arm a collar is turned axially so as to draw the pulley-collars from the pulleys and thus to leave them free to turn; the spring-bands and the pulleys can also be adapted for balancing sashes.

23,124.—MINERS' AND OTHER SAFETY LAMPS: *C. H. Wolf.*—To light the lamp is devised an inflammable tape, which carries pellets that are ignited by friction instead of by percussion: the teeth of a spring rack feed the tape, which moves readily upwards, but not so readily downwards (owing to the shape of the teeth), whilst a spring scratcher ignites the pellets.

23,151.—OIL LAMPS AND STOVES: *A. Thorpe.*—The object of the inventor is to facilitate the filling of the oil-reservoirs; he puts an eyelet around the stem of the float, which indicates the level of the oil; the filling nozzle is pivotted to a rotating closing-piece or valve by means of the eyelet; the reservoir can be filled when openings, cut in the valve and nozzle, coincide; in other positions the valve is turned so as to close the openings in the nozzle.

23,184.—FASTENINGS FOR SASHES: *J. Walsh.*—A bracket on the lower sash-rail holds the pivot of an eccentric, to the strap whereof is attached a hook which engages in a loop upon the upper sash-rail, the hook is adjusted by turning the eccentric so as to force the hook tightly against the loop, and so to draw the sashes closely together.

23,198.—ACETYLENE GAS GENERATOR: *A. Molet.*—A passage connects the lower water chamber with the calcium chamber which has an inclined bottom, and is placed above a separate chamber wherein is a device, to be worked by electricity, clockwork, &c., for oscillating a hammer, the device being put into operation by means of a catch upon a rod that passes through a tube to a float in the water chamber beneath; when gas passes to the service pipes water enters the water chamber and so raises the float, the hammer then strikes against the inclined bottom of the calcium chamber, and its vibration causes some carbide to fall down into the water, the generated gas thereupon forces the water back, and the mechanism for moving the hammer ceases to move with the falling of the float.

23,210.—SYPHON DISCHARGE OF WATER-CLOSETS: *D. G. Wallace.*—To meet cases of breakage of the seal the inventor has devised means of automatically re-sealing a syphon-discharge closet; the syphon is contained within a casing placed inside the flushing tank, and the syphon communicates with a pipe which ends just over the level of the water-seal in the closet-pan; the small syphon is started to re-fill the pan and prevent the escape of sewer-gas, if the pan is emptied of its contents; when the syphon is emptied, the contents of a chamber that communicates with the syphon both above and below, return in part, so that sewer gas cannot escape through the flushing-tank.

23,297.—GAS COOKING AND HEATING-STOVES: *W. McCaig.*—The gas passes from the supply chamber through nozzles into a mixing chamber and the mixing tubes, and so to the burners, the two chambers being arranged behind the stack in the grate; for this arrangement the advantage of preventing "lighting-back" is claimed.

23,378.—MANUFACTURE AND FIXING OF ROOFING TILES: *R. Walker.*—A bevelled frame holds the mould

tray upon which the plastic material is laid, to be levelled with a blade or tool; to the table is hinged the frame, which forms a recess in the tile's upper face, and by drawing a trowel along the mould's upper bevelled edges, upper bevelled ribs are made in the tile. Pieces of metal can be inserted in the tile at the hanging nibs and nail holes, and it may be secured to the lath by a staple or hook inserted into a loop or eye underneath; the bevelled ribs are adapted to prevent the passage of moisture derived from condensation within the building.

23,470.—INCANDESCENT ELECTRICAL LAMPS: *W. Nernst.*—The lamps, which have magnesia or other oxide incandescent bodies, are fitted with resistant metal wires. In one modification of the invention, a concave porcelain reflector, which contains a coil of platinum wire, has the incandescent body fixed at its focus. The current heats the body until it conducts enough to take a current from a separate or parallel circuit; then the operator's hand, or a cut-out worked by the current supplied to the incandescent body, may stop the current to the platinum wire.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

January 24.—By LOWDEN & POSTLETHWAITE (at Barrow-in-Furness).

Barrow-in-Furness, Lancs.—Abbey-rd., Crosslands, and 13 a. 2 r. 18 p., part f. and part u.t. 44 yrs., g.r. 73*l.* 8s.	£3,100
95 to 113 (odd), Ainslie-st., f.	1,260
Ainslie-st., five building plots, area 13,807 yds., f.	1,804

January 26.—By T. LAVINGTON & WATERS & RAWLENCE (at Devizes).

Stockley, Wilts.—Freehold house, homestead, and 52 a. 3 r. 23 p.	2,100
The Allotment and Hobbs Ley, 21 a. 1 r. 14 p., f.	400

January 30.—By CLIMPSON & JOHNSON.

Thornton Heath.—36 to 48 (even), Beulah-rd. North, f.	1,950
Peckham.—188, 190, 192, and 194, Hollydale-rd., u.t. 75 yrs., g.r. 18*l.*	1,000
Balham.—50 and 52, Sistova-rd., u.t. 78½ yrs., g.r. 14*l.* 14s., r. 66*l.*	515

By ROBSON & PERRIN.

Barnsbury.—20, Sheen-grove, u.t. 37½ yrs., g.r. 6*l.*, r. 42*l.*	260
Hornsey.—Green Lanes, Warden Villa and Newent Villa, u.t. 30 yrs., g.r. 6*l.*, r. 90*l.*	620

By WRIFORD & DIXONS.

Twickenham.—The Avenue, Avenue Villa, f., e.r. 60*l.*	610

By J. PLUMER CHAPMAN.

Eastbourne, Sussex.—6, 10, and 12, Calverley-rd., f., r. 110*l.*	2,010

January 31.—By DEBENHAM, TEWSON, & Co.

Battersea.—2, 6, 8, 22, and 30, Rush Hill-rd., u.t. 73 yrs., g.r. 30*l.*, r. 158*l.* (in lots)	1,620
Brixton.—Brixton Hill, f.g.r. 30*l.*, reversion in two yrs.	2,650

By C. W. DAVIES.

Stroud Green.—142, 146, and 148, Hanley-rd., u.t. 70 yrs., g.r. 25*l.* 4s., r. 120*l.*	1,265
Higbury.—145, Petherton-rd., u.t. 50½ yrs., g.r. 7*l.* 7s., e.r. 70*l.*	725
Maida Vale.—11 and 12, Northwick Mews, u.t. 23 yrs., g.r. 10*l.*, r. 60*l.*	255

By DUNCAN & KIMPTON.

St. John's Wood.—Cavendish-rd. West, i.g.r. 20*l.*, u.t. 21½ yrs., g.r. nil	245
Clapton.—21, Reighton-rd., u.t. 79½ yrs., g.r. 6*l.* 10s., r. 36*l.*	365
Camden Town.—Great College-st., i.g.r. 22*l.*, u.t. 23 yrs., g.r. nil	280

By L. FARMER.

Camberwell.—278 and 280, Camberwell-rd., f., r. 110*l.*	2,625

By RUTLEY, SON, & VINE.

New Southgate.—Bowes-rd., The Woodlands, f...	1,020
Holloway.—49 and 51, Marlborough-rd., u.t. 67 yrs., g.r. 14*l.* 14s., r. 80*l.*	880
Kentish Town.—131, Prince of Wales-rd., u.t. 13 yrs., g.r. 7*l.*, r. 40*l.*	150

By VERNON & SON.

Edmonton.—180, Upper Fore-st., f., r. 50*l.*	1,350
Norwood.—8, 10, 12, and 14, Palace-rd., f., r. 112*l.*	1,370
Netley, Hants.—1 to 10, Arthur-ter., u.t. 983 yrs., g.r. 7*l.*	760

By F. WARMAN.

Canonbury.—4, Alwyne Villas, u.t. 47 yrs., g.r. 10*l.*, e.r. 60*l.*	500
32, St. Mary's-rd., u.t. 46 yrs., g.r. 10*l.*, r. 63*l.*	625
Highbury.—4, Highbury New Park, u.t. 50½ yrs., g.r. 15*l.*, r. 75*l.*	900

February 1.—By H. CHAPMAN & Co.

Leyton.—Tyndall-rd., a plot of building land, f...	550

By S. FORTESCUE & SONS.

Forest Gate.—547 to 557 (odd), Romford-rd., u.t. 88½ yrs., g.r. 36*l.*, r. 186*l.*	1,810

By S. BRADFORD (at Masons' Hall Tavern).

Folkestone, Kent.—"The Rose Hotel," f., with goodwill	8,750

By A. PREECE (at Acton).

Kew Gardens.—16 and 18, Clarence-rd., u.t. 68 yrs., g.r. 12*l.* 12s., r. 57*l.*	585
Acton.—6, 8, and 10, High-st., u.t. 69 yrs., g.r. 16*l.* 10s., r. 96*l.*	1,025
5, Birkbeck-rd., u.t. 69 yrs., g.r. 5*l.*, r. 26*l.*	250
1 and 3, Mansell-rd., u.t. 61 yrs., g.r. 12*l.*, r. 49*l.*	470

By BALCH & BALCH (at Camden Town).

Regent's Park.—3, Kingstown-st., u.t. 48½ yrs., g.r. 5*l.*, r. 30*l.*	225

February 2.—By COOPER & GOULDING.

Chiswick.—16, 17, and 18, Hogarth-lane, f.	750
1 to 35 (odd) and 2 to 24 (even), Hogarth-av., f., (in lots)	5,485
181, 183, 189, 191, 193, and 195, Devonshire-rd., f., (in lots)	1,135
Devonshire-rd., f.g. rents 14*l.*, reversion in 77 yrs.	400

By STEPHENSON & ALEXANDER (at Cardiff).

Cardiff, Glamorgan.—59 and 60, Mount Stuart-sq., area 520 yds., u.t. 52½ yrs., g.r. 10*l.* 8s. 6d.	6,350
218, Bute-st., u.t. 52½ yrs., g.r. 11*l.* 1s. 3d.	1,000

By EDWIN EVANS (at Clapham Junction).

Battersea.—68, 70, 72, 74, 104, 106, 108, and 110, Sugden-rd., u.t. 87 yrs., g.r. 56*l.*, r. 327*l.* 2s.	£2,505
45, Marney-rd., u.t. 87 yrs., g.r. 32*l.*	310
421 and 423, Battersea Park-rd, and 1a and 2a, St. James-pr., u.t. 66½ yrs., g.r. 6s.	1,180
32, Este-rd., u.t. 45 yrs., g.r. 4*l.*	200
48, Castle-st., u.t. 78 yrs., g.r. 6*l.*, r. 40*l.*	510
22 and 24, Kennard-st., u.t. 70 yrs., g.r. 11*l.*	405
Wandsworth.—15, Aspley-rd., f., r. 35*l.*	535
9, 11, 13, and 15, Maskell-rd., f.	855
96 and 98, Sugden-rd., u.t. 86½ yrs., g.r. 14*l.*	630
28, 32, 42, 44, 46, and 48, St. Julian's Farm-rd., u.t. 82 yrs., g.r. 44*l.* 2s., r. 182*l.*	1,515
133 to 139 (odd), St. James'-rd., f., r. 120*l.*	1,980

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G.	ton	8/0/0 0/0/0
Teak, E.I.	load	10/10/0 15/10/0
Sequoia, U.S.ft.cu.		1/9/0 2/0/0
Ash, Canada, load		3/17/6 5/5/0
Birch, do.		3/0/0 5/0/0
Elm, do.		4/12/6 5/15/0
Fir, Dantsic, &c.		2/0/0 4/0/0
Oak, do.		3/5/0 3/15/0
Canada		4/0/0 6/0/0
Pine, Canada red.		0/0/0 0/0/0
Do. yellow		4/7/6 6/5/0
Lath, Dantsic, fath		4/10/0 5/10/0
St. Petersburg		4/0/0 6/10/0
Wainscot, Riga, &c., log		3/15/0 5/15/0
Odessa, crown		3/15/0 5/15/0
Deals, Finland 2nd & 1st std. 100		9/15/0 10/5/0
Do. 4th & 3rd		9/15/0 10/5/0
Do. Riga		8/5/0 9/5/0
St. Petersburg, 1st yellow		11/15/0 14/5/0
Do. 2nd yellow		10/15/0 12/5/0
Do. white		9/15/0 11/15/0
Swedish		9/15/0 16/15/0
White Sea		10/15/0 18/0/0
Canada, Pine 1st		18/15/0 25/5/0
Do. do. 2nd		13/15/0 17/0/0
Do. do. 3rd, &c.		6/0/0 10/0/0
Do. Spruce, 1st.		8/10/0 10/10/0
Do. do. 3rd and 2nd		7/5/0 8/10/0
New Brunswick		7/5/0 8/0/0
Battens all kinds		5/0/0 16/0/0
Flooring boards, sq., 1 in., prep. 1st		9/6 16/3
Do. 2nd		8/0 13/3
Other qualities		6/3 7/0
Cedar, Cuba, ft.		/4 /4½
Honduras, &c.		/3½ /4½
Mahogany, Cuba.		/5½ /7
St. Domingo, cargo av.		/5 1/3
Mexican, do. do.		/3½ /4
Tobasco, do. do.		/4 /6½
Honduras, do.		/4 /6
Box, Turkey, ton.		4/0/0 15/0/0
Rose, Rio		7/0/0 14/0/0
Bahia		6/0/0 12/0/0
Satin, St. Doming.		/5 1/0

TIMBER *(continued)*.		
Satin, Porto Rico	0/0/9	0/2/0
Walnut, Italian	0/0/3	0/0/7
METALS.		
Iron—Pig, in Scotland	ton	2/15/3½ 0/0/0
Bar, Welsh, in London		6/0/0 6/5/0
Do. do. at works in Wales		5/15/0 5/17/6
Do. Staffordshire, in London		6/5/0 7/10/0
COPPER—British cake and ingot		79/0/0 79/10/0
Best selected		80/0/0 80/10/0
Sheets, strong		81/0/0 83/0/0
Chili bars		74/10/0 0/0/0
YELLOW MTL. lb.		7d. 7¼d.
LEAD—Pig Spanish	ton	15/5/0 0/0/0
English com. Brands		15/10/0 0/0/0
Sheet, English 6 lbs. per sq. ft. and upwards		16/10/0 0/0/0
Pipe		17/0/0 0/0/0
ZINC—English sheet	ton	30/0/0 0/0/0
Vieille Montagne		31/0/0 0/0/0
Spelter		27/12/6 27/15/0
TIN—Straits		108/7/6 0/0/0
Australian		108/15/0 109/5/0
English Ingots		111/10/0 112/10/0
Banca		0/0/0 0/0/0
Billiton		0/0/0 0/0/0
OILS.		
Linseed	ton	17/10/0 0/0/0
Cocoanut, Cochin		27/15/0 0/0/0
Do. Ceylon		24/10/0 0/0/0
Palm, Lagos		21/15/0 0/0/0
Rapeseed, English pale		22/15/0 0/0/0
Do. Brown		21/5/0 0/0/0
Cottonseed ref.		15/0/0 16/0/0
Oleine		17/0/0 18/0/0
Lubricating U.S.		0/5/3 0/7/6
Do. Black		0/5/0 0/6/6
TAR—Stockholm barrel		1/5/0 0/0/0
Archangel		0/18/0 0/0/0
Turpentine		31/15/0 0/0/0

TO CORRESPONDENTS.

J. and M.—F. C. H. (Amounts should have been stated.)

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ABERDEEN.—For additions to the United Presbyterian Manse, Aberchirder. Mr. R. G. Wilson, architect, 181a, Union-street, Aberdeen:—

Masonry.—Leslie Gregor, Aberchirder
Carpentry.—Alexr. Auld ,,
Slating.—Alfred J. Ross, Macduff
Plumbing.—Chas. Duthie, Turriff
Plastering.—Geo. G. McKay, Keith
} £180

ACCRINGTON.—For making a number of streets for the Corporation. Mr. W. J. Newton, C.E., Town Hall, Accrington:—
G. Adams, Oswaldtwistle.*
* Accepted at per schedule of prices.

BEDFORD.—For paving, &c., Bushmead-avenue, for the Corporation. Mr. John Lund, Borough Surveyor, Town Hall, Bedford:—

Patent Victoria Stone Co.	£918 9 7	A. Henman	£899 15 0
		G. S. Jarvis, Bedford*	859 0 0

* Accepted.

BIRMINGHAM.—For the erection of nurses' mess-room, &c., at workhouse infirmary, for the Union Guardians. Mr. W. H. Ward, architect, Paradise-street, Birmingham:—

C. Reeve & Son	£2,681	Whitehouse & Son	£1,997
Smith & Pitts	2,330	J. Atkinson	1,991
R. Fenwick	2,279	T. Elvins	1,990
C. Bryant	2,240	W. Robinson	1,980
W. H. Gibbs	2,175	Gowing & Ingram, Belgrave-road, Birmingham*	1,789
H. Hemming	2,100		

* Accepted.

BRACKENTHWAITE.—For the erection of two bridges over Hope Beck, for the Cockermouth Rural District Council. Mr. J. B. Wilson, C.E., Council Offices, Cockermouth:—

Jno. Bolton	£207	M. Green, Cockermouth*	£153
Wren & Lindsay	164		

* Accepted.

CARDIFF.—For the formation of roads, Penllyn Castle Estate Canton. Messrs. Veall & Sant, architects, Cardiff:—

Charles Gardner	£3,858	Barnes, Chaplin, & Co.	£1,750
D. Thomas	2,017	F. Ashley, Cardiff*	1,561

* Accepted.

CARLISLE.—For laying a sewer, Moorville, Stainwix, for the Rural District Council. Mr. Geo. Armstrong, architect, 24, Bank-street, Carlisle. Quantities by architect:—

J. & R. Bell	£399 2 4	T. Scott	£315 0 0
M. Green	377 19 0	J. & W. Baty, Carlisle*	295 0 0
W. Leighton	330 0 0	Accepted.	

COLNEY.—For the superstructure of All Saints' Convent Chapel, Colney, Herts. Messrs. George T. Hine and Leonard Stokes, architects, Westminster. Quantities by Mr. E. C. Pinks:—

J. Shillibeer & Sons	£45,000 0 0	E. Dunham	£41,667
Higgs & Hill	44,500 0 0	Gough & Co.	40,834 0 0
J. Norris & Son	43,424 0 0	Parnell & Co.	39,365 0 0
Miskin & Sons	43,079 0 0	Stimpson & Co.	39,100 0 0
J. Howe & Co.	42,507 0 0	W. King & Son, London*	38,574 0 0
Foster & Dicksee	41,831 0 0		

* Accepted.

DARTMOUTH.—For laying footpaths, &c., Ford Cross to Hillside Villa, for the Urban District Council. Mr. T. O. Veale, Surveyor, Council Offices, Dartmouth:—

E. P. Veale	£201 16 8	R. Watts	£196 5 3
	[Both of Dartmouth].		

DROYLSDEN (Lancs.).—For the construction of sewers, Manchester and other roads, for the Urban District Council. Mr. W. Curry, Surveyor, Council Offices, Droylsden:—

H. H. Davison	£3,547 19 0	G. M. Collins	£2,993 5 0
W. Briggs	3,143 12 0	Etheridge & Clarke, Manchester*	2,826 14 0
James Bacon	3,111 17 0		
John Randall	2,994 7 0	R. C. Fish†	2,494 3 9

* Accepted. † Withdrawn.

EASTDOWN (Devon).—For additions to schools, for the School Board. Mr. James Mayne, architect:—

W. Sanders	£494 6 8	Wm. Cutcliffe	£397 0 0
W. C. Latham	492 2 2	Hussell & Hancock, Eastdown (accepted)	390 10 0
George Lovering	488 10 0		
Goss Brothers	410 0 0	I. & J. Phillips	349 15 0

HENDON (Middlesex).—For the execution of sewerage works, Highwood Hill, for the Urban District Council. Mr. S. S. Grimley, surveyor, The Burroughs, Hendon:—

—	Best London Stoneware Pipes.	Wakefield's Corrugated Socket Pipes.	Approved Country Pipes.
	£ s. d.	£ s. d.	£ s. d.
F. Dupont	3,221 6 11	3,198 10 5	3,176 18 1
R. Jackson	2,584 13 3	2,523 8 9	2,494 12 9
E. Hollingsworth	2,227 7 8	2,227 7 8	2,202 10 3
E. T. Bloomfield	2,144 11 2	2,113 5 6	2,077 15 11
Wilkinson Brothers	2,082 0 0	2,037 0 0	2,030 0 0
M. S. Kitteringham	1,945 10 2	1,895 3 2	1,869 19 8
R. Ballard, Limited	1,924 4 10	1,884 11 4	1,855 15 4
A. T. Catley	1,870 0 0	1,985 0 0	1,840 0 0
Clift Ford	1,851 0 0	1,821 0 0	1,792 0 0
T. Adams, Green Lanes, Wood Green, N.*	1,798 11 4	1,730 1 10	1,700 13 8
F. H. White & Co.	1,511 18 6	1,490 16 7	1,466 10 1

* Accepted.

LONDON.—For new lavatory and alterations to Infirmary, St. George's-in-the-East, for the Guardians. Mr. Wilson, architect:—

Vigor	£485	Wall & Co.	£435
Calman & Co.	475	J. Appleby	427
Hearle & Farrow	463	Gibbs	419
Darby	453		

LONDON.—For additions, &c., to Ratcliffe Workhouse, Salmon lane, for the Stepney Union Guardians. Mr. R. Banks Martin, architect, 103, Plashet-grove, East Ham:—

J. G. Horlock	£945	W. Stuttle & Son	£807
A. Porter	838	Gregory & Co.	797
C. Lawrence	830	H. Wall & Co.*	707
T. Willson	830	General Builders, Limited	700

* Accepted.

LONDON.—For the erection of St. Mary's Parochial Building, Tottenham, London, N. Messrs. J. E. K. & J. P. Cutts, architects, Southampton-street, Strand:—

Bright & Son	£3,995	A. Porter	£3,725
Humphreys & Son	3,950	S. J. Scott	3,720
James Stewart	3,831	Green & Boxall	3,680
Cornish & Gaymer	3,784		

LONDON.—For alterations to the "Duke of York," Downham-road, Kingsland, for Mr. F. Coucher. Mr. Edward Brown, architect, Commercial-street, Bishopsgate:—

J. V. Kiddle & Son	£834 0 0	W. Laurence	£475 0 0
G. Newton	814 4 10	R. Preston	465 0 0
J. & W. T. Inkpen	770 0 0		

Gasfitting.

Vaughan & Brown	£135 0	J. Steadman	£105 0
Dupuy, Pottier, & Adams	132 15		

LONDON.—For constructing roads, sewers, and drains at Heathville-road, Crouch Hill, N. Messrs. Wootton & Green, auctioneers, surveyors, and valuers, 36, Gracechurch-street, E.C.:—

	No. 1.	No. 2.
Wm. Griffiths	£801 14 6	£114 12 8
E. Rogers & Co.	689 0 0	115 0 0
P. A. Jackson & Son	685 15 0	109 12 0
J. A. Dunmore	678 3 0	112 7 3
Thos. Adams	676 0 0	111 0 0
C. W. Killingback & Co.	670 0 0	109 0 0

LONDON.—For erecting shops and flats, No. 54, Goodge-street, W., for Messrs. W. & A. Curnick. Messrs. White & Page, architects. Quantities by Messrs. Northcroft, Son & Neighbour:—

Higgs & Hill	£3,580 0	H. Wall & Co.	£3,069 0
Simpson and Sons	3,547 0	J. Smith & Sons	3,055 0
Patman & Fotheringham	3,441 0	Barrett & Power	3,013 0
E. Lawrence & Sons	3,157 0	J. Lidstone & Son	2,073 10
Bywaters & Sons	3,101 0	F. T. Chinchen*	2,694 0

* Accepted.

LONDON.—Accepted for addition to Battersea Laundry, for Messrs. Spiers & Pond:—
Kirk & Kirk, Westminster £769

LONDON.—For the construction and completion of the new street from Fenchurch-street to Crutched Friars, to be called Lloyd's-avenue, for the Corporation of London:—

Pedrette	£18,462	Killingback	£12,317
Jackson	13,970	Dolman	12,140
Ford & Co.	12,690	Mowlem	8,980
Minter	12,339		

LONDON.—Accepted for works at the Northern Hospital, for the Metropolitan Asylums Board :—

Section 1.—Switchboards, Booster, and Connexions.

Cox-Walkers, Darlington £463 10
Consulting Engineers' Estimate, £600.

Section 2.—Battery.

Hart Accumulator Co., Ltd., Stratford .. £318 12 £15 4*
Consulting Engineers' Estimate, £400.

Section 3.—Electrical Mains.

Callender's Cable and Construction Co., Ltd., Cannon-street, E.C. £773 1 6
Consulting Engineers' Estimate, £1,100.

Section 4.—Steam Exhaust Feed and Drain Pipes.

R. Taylor & Sons, Marsden, Yorks £840
Consulting Engineers' Estimate, £400.

Section 5.—Wiring and Fittings.

G. Weston & Co., Fenchurch-street, E.C. £2,875
Consulting Engineers' Estimate, £2,850.
* Annual Maintenance for five years.

LONDON.—Accepted for general repairs to 130 houses in the district of St. Luke's. Mr. George Hubbard, architect :—
J. W. Heeps £1,981

NORMANTON-BY-DERBY.—For additions to school buildings, for the School Board. Messrs. Naylor & Sale, architects, Irongate, Derby :—

King & Harrison	£1,801 9 0	A. B. Clarke	£1,700 0 0
Alfred Smith	1,790 0 0	George Wagg, Norman, Derby*	1,675 15 6
J. Parker & Son	1,784 15 0	Henry Jordan	1,670 14 11½
J. T. Tomlinson & Co.	1,770 0 0	H. J. Robinson	1,650 0 0

* Accepted.

PAUL (Cornwall).—For additions to schools, Churchtown, for the School Board :—

Masonry and Plumbing.

Charles Tregensa, Mousehole, near Penzance £181 19

Carpentering.

Thos. J. Harvey, Newlyn, near Penzance 91 0
272 19

PETERBOROUGH.—For the erection of two villas and studio, Park-road, Peterborough, for Mr. Robert Christian. Mr. J. G. Stallebrass, architect, North-street, Peterborough. Quantities by architect :—

D. Gray	£1,252	Sibley Bros.	£1,195
Watson & Lucas	1,220	G. Nichols	1,160
S. Hipwell & Co.	1,215	J. Guttridge (accepted)	1,135
R. J. Nichols	1,200	G. Brown	1,125

[Proprietor to provide heating apparatus, grates, locks, &c.].

PICKERING.—Accepted for the execution of water-supply works, Crofton, for the Rural District Council. Mr. J. E. Parker, engineer, Post Office Chambers, Newcastle-on-Tyne :—
Charles Firth, 5, Oak-road, Scarborough £1,450
[Twelve tenders received.]

PINNER.—For erecting nine villas at Pinner, for Mr. F. D. Thomas. Mr. T. S. Stephens, architect, 28, Conningham-road, Shepherd's Bush :—

J. Parker	£6,010	A. Wright	£5,290
M. J. Crooks*	5,400	* Accepted.	

ROCHESTER.—For the erection of a fire-escape station, Station-road, Strood, for the Corporation. Mr. W. Banks, C. E., Guildhall, Rochester :—

T. G. Sandford, Jun.	£154	W. Coker, Halling, Rochester (accepted)	£137

SHORTLANDS.—For erecting a residence at Shortlands, Kent, for Mr. J. A. Kurtz. Messrs. Crickmay & Zimmermann, architects, 4, Mincing-lane, E.C. :—

Beer & Gash	£1,700	Kirk & Kirk, Westminster*	£1,600
Duthoit	1,650	* Accepted.	

SOUTHAMPTON.—For the construction of sewage tanks, &c., for the Corporation. Mr. W. B. G. Bennett, C.E., Borough Engineer, Municipal Offices, Southampton :—

B. Cooke & Co.	£6,715	Roe & Grace	£5,995
G. Bell	6,491	Playfair & Toole, Southampton*	5,870
H. W. Bull	6,106	H. C. Dovet†	5,430
Jenkins & Sons	6,099	* Accepted. † Informal.	

SURBITON.—For the construction of sewers, Minnie Dale, for the Urban District Council. Mr. S. Mather, C.E., Victoria-road, Surbiton :—

R. T. Burnell	£827 14 0	S. Kavanagh	£510 4 4
C. W. Killingback & Co.	557 0 0	S. Atkins, Kingston-on-Thames*	482 0 0

* Accepted.

SUTTON.—For the erection of a house, &c., at Belmont, for Mr. Malcolm Ross. Mr. W. Culling Gaze, architect, 2, Walbrook, E.C. Quantities by the architect :—

S. Page	£2,038 6 6	W. Potter	£1,551
H. Clark	1,574 0 0	E. J. Burnand	1,485
J. B. Potter	1,566 0 0	F. S. Shopland	1,387

WALLINGFORD (Berks).—For the erection of a residence, Shillingford, for Mr. Jas. Mitchell. Mr. S. Johns, architect, Wallingford :—

C. J. Goodchild	£4,488 0	Brasher & Sons, Wallingford*	£1,850 10
A. I. Carley	1,960 0		
E. Holly	1,895 10		

* Accepted. Also accepted for boundary walls, deep well and fittings.

WATERVILLE (co. Kerry).—For the erection of a cable station, offices, &c., for the Commercial Cable Company. Mr. J. F. Fuller, architect, Brunswick Chambers, Dublin :—

For station only. Dwellings for officials postponed.

D. Foley	£5,450 0 0	S. Hill, Cork*	£4,349 0 0
Collen Bros.	5,050 0 0	Jones	4,317 0 0
Hemmingway	4,472 2 2	Healey	4,296 16 8

* Accepted.

WHICKHAM (Durham).—For the construction of sewers, &c., Asylum-lane, Dunston, for the Urban District Council. Mr. J. P. Spencer, C.E., 13, Grainger-street West, Newcastle-upon-Tyne :—

W. Craig	£437 11 3	A. Noble	£386 15 0
G. E. Simpson	393 2 0	J. Thompson, Gosforth*	341 7 0

* Accepted.

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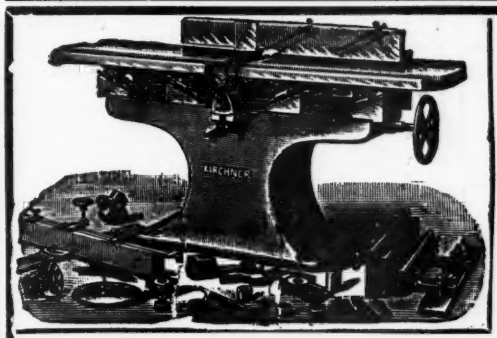

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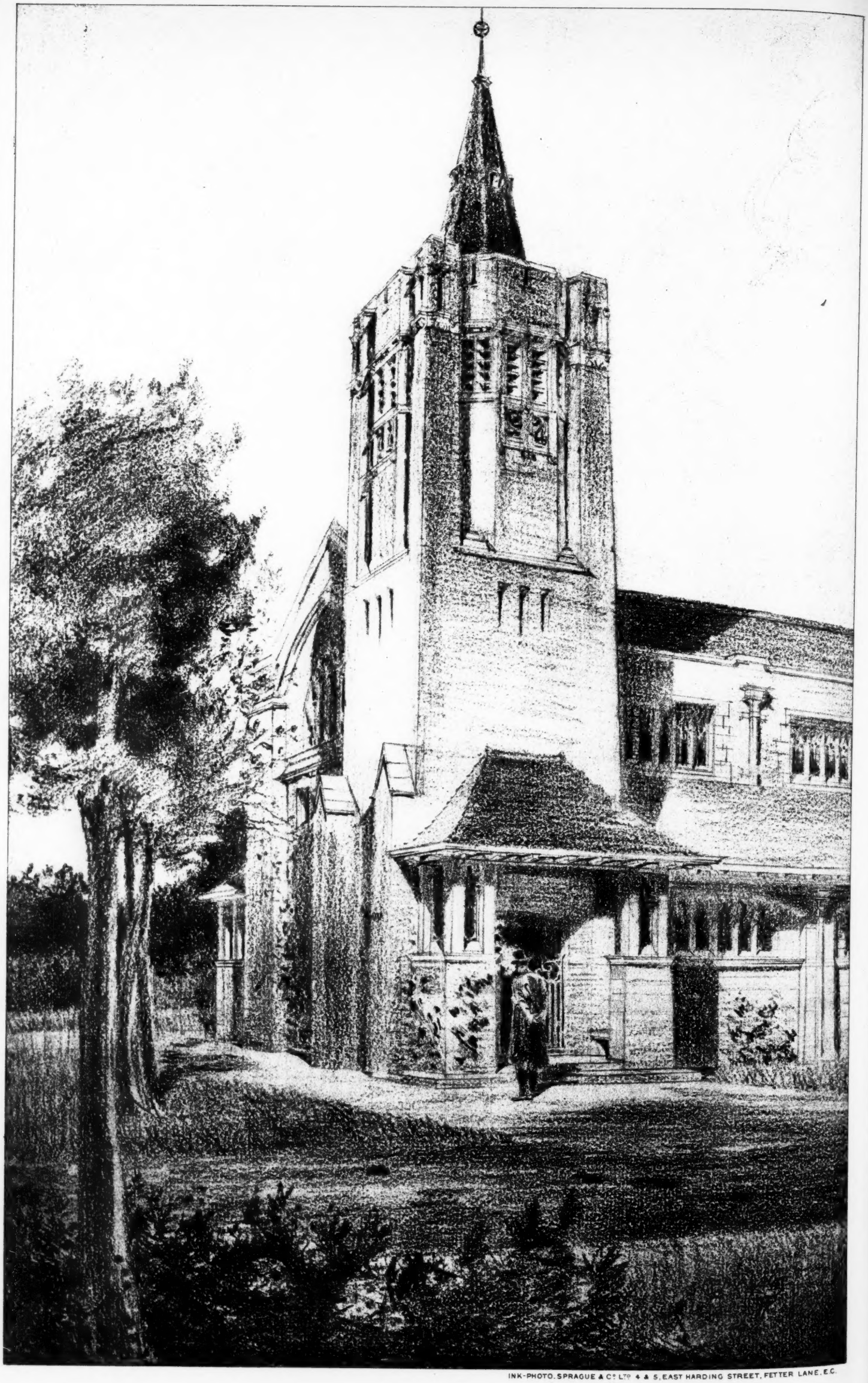

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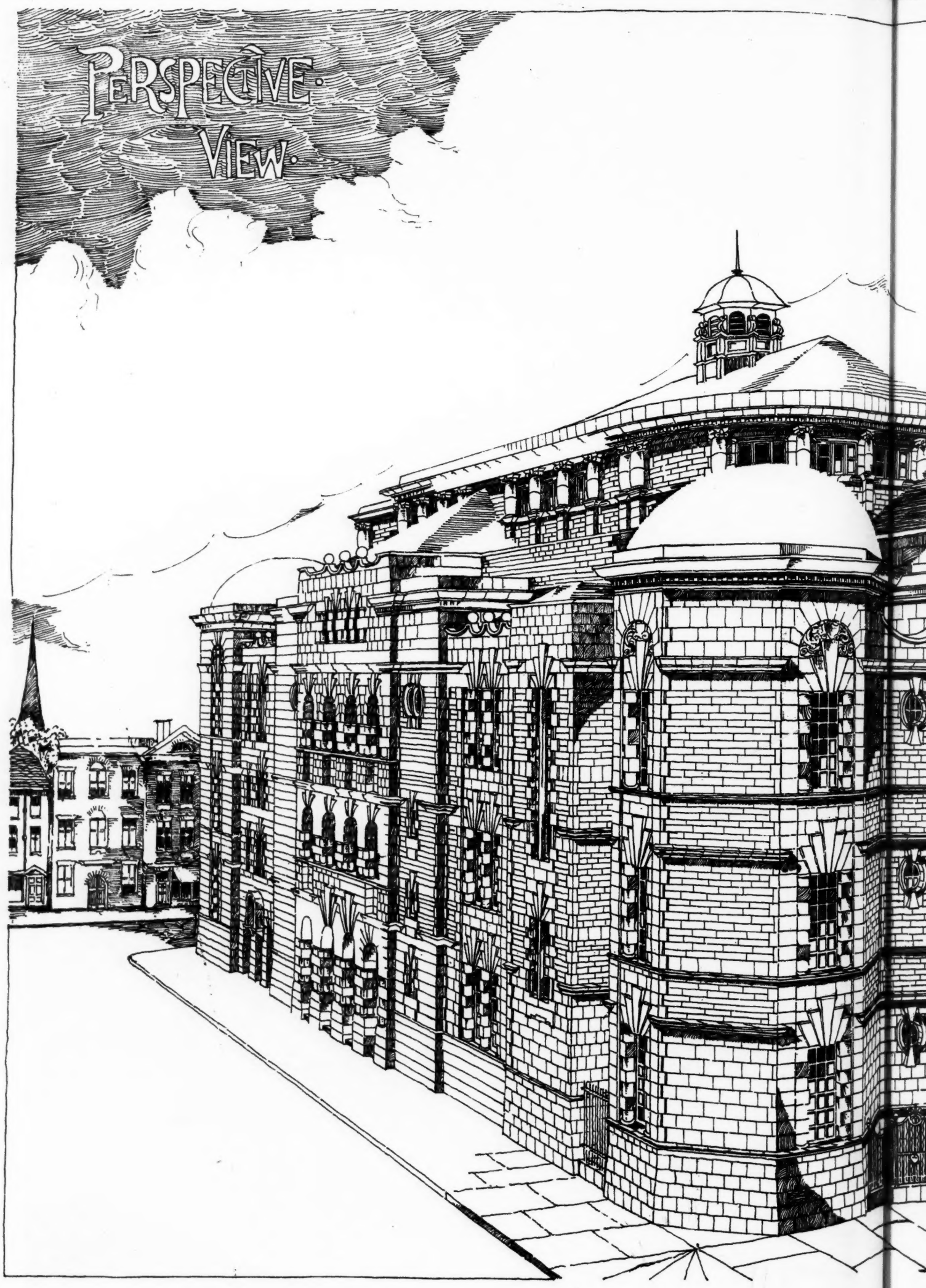

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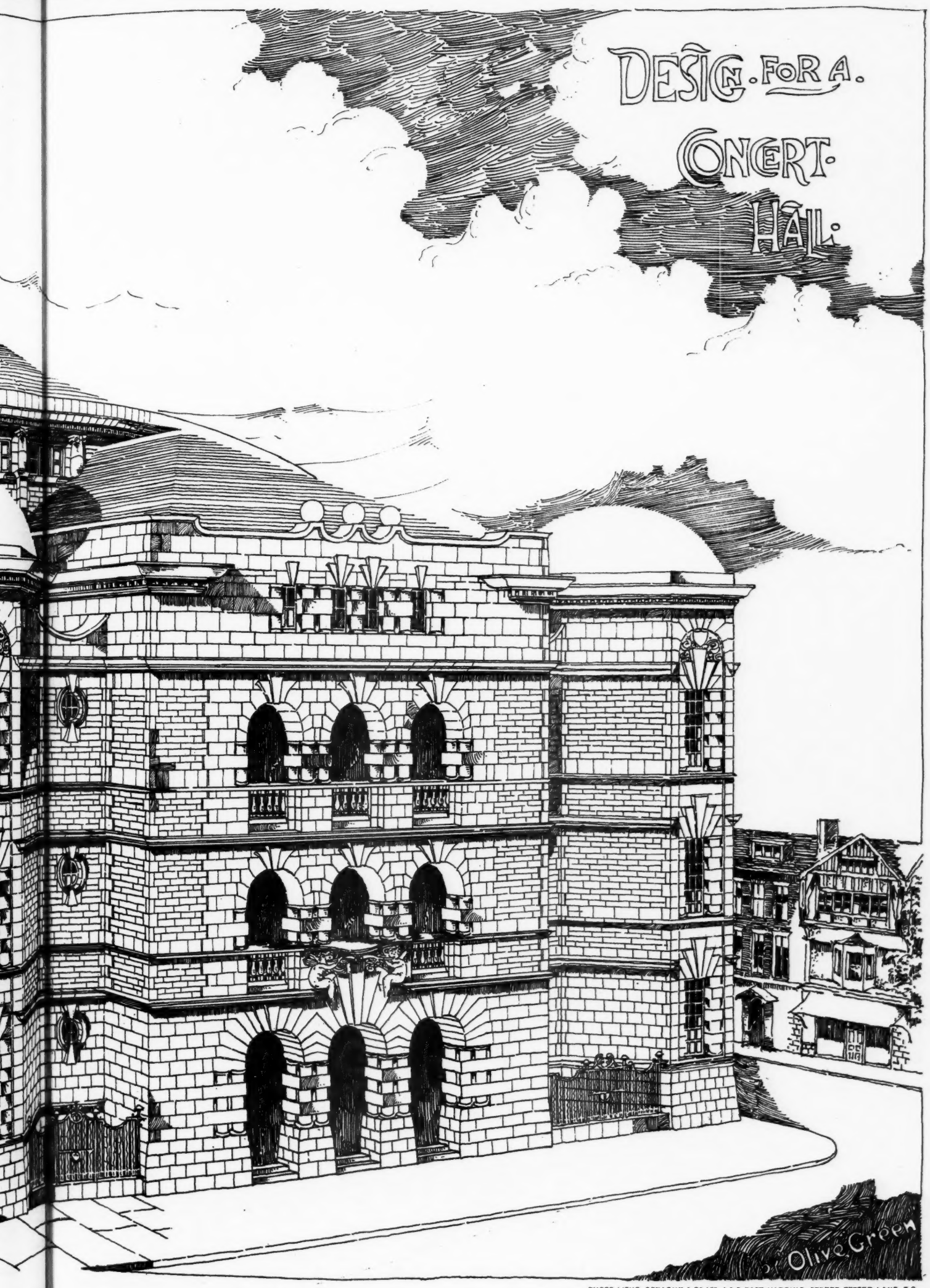

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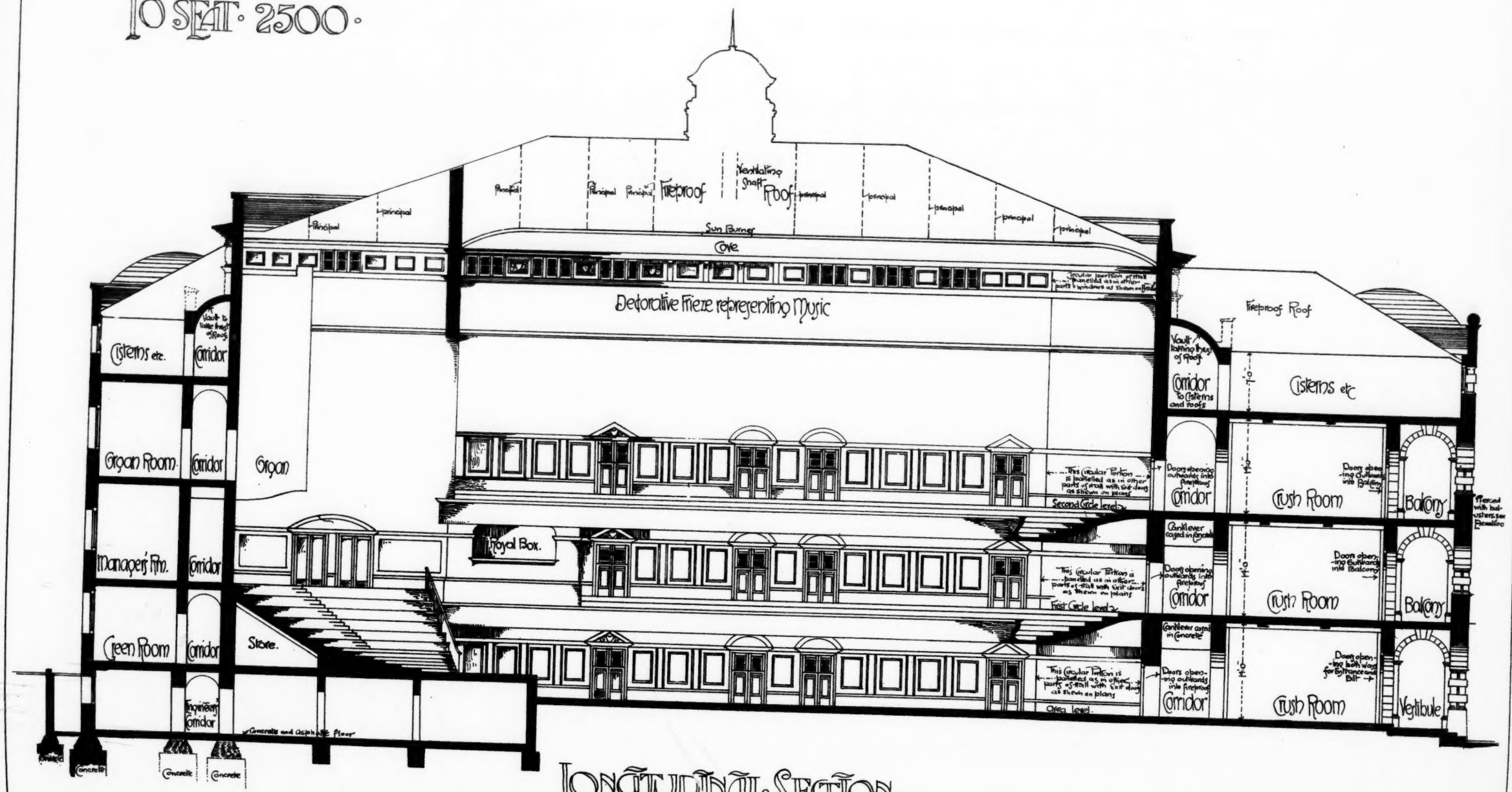

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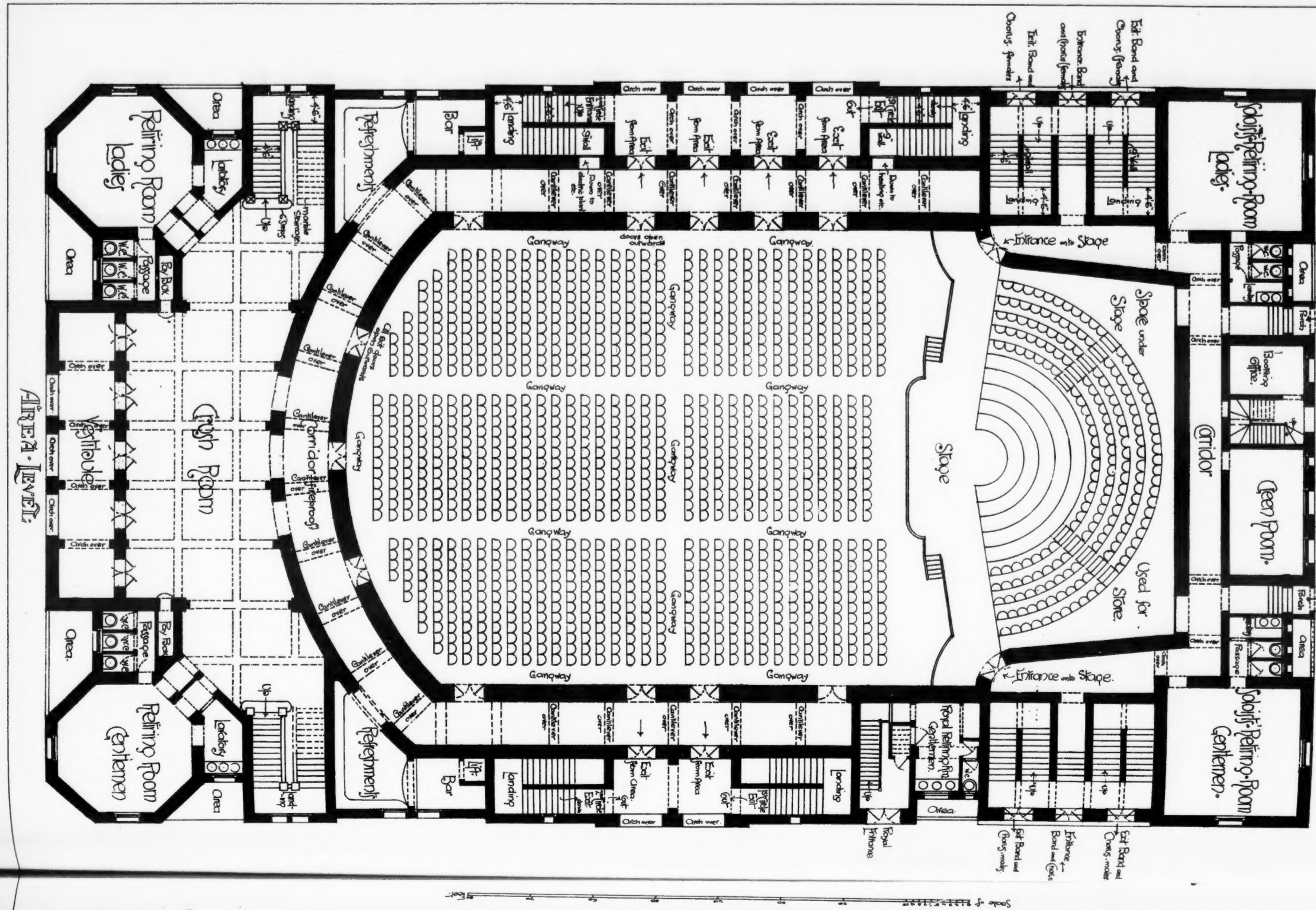

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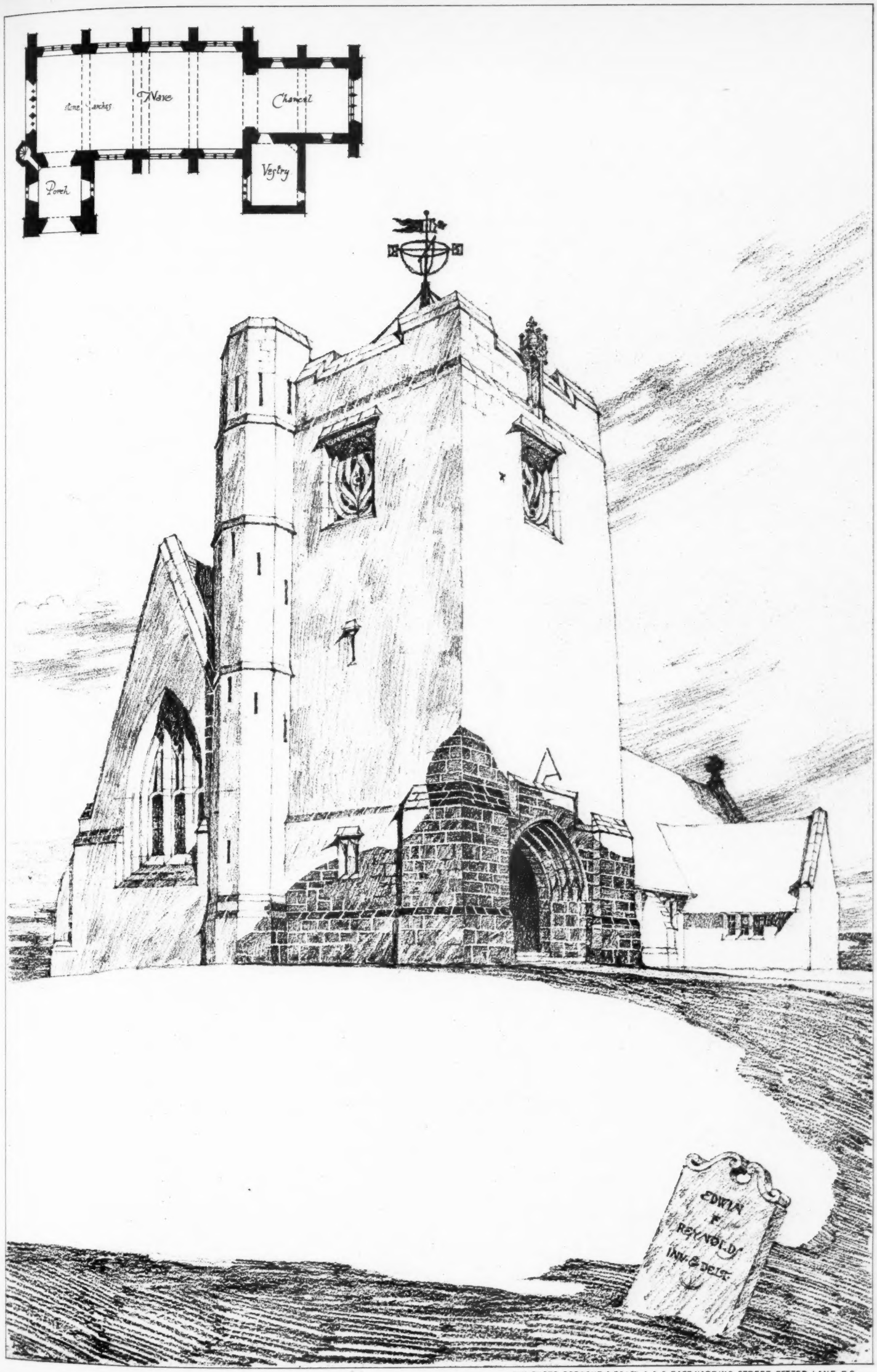

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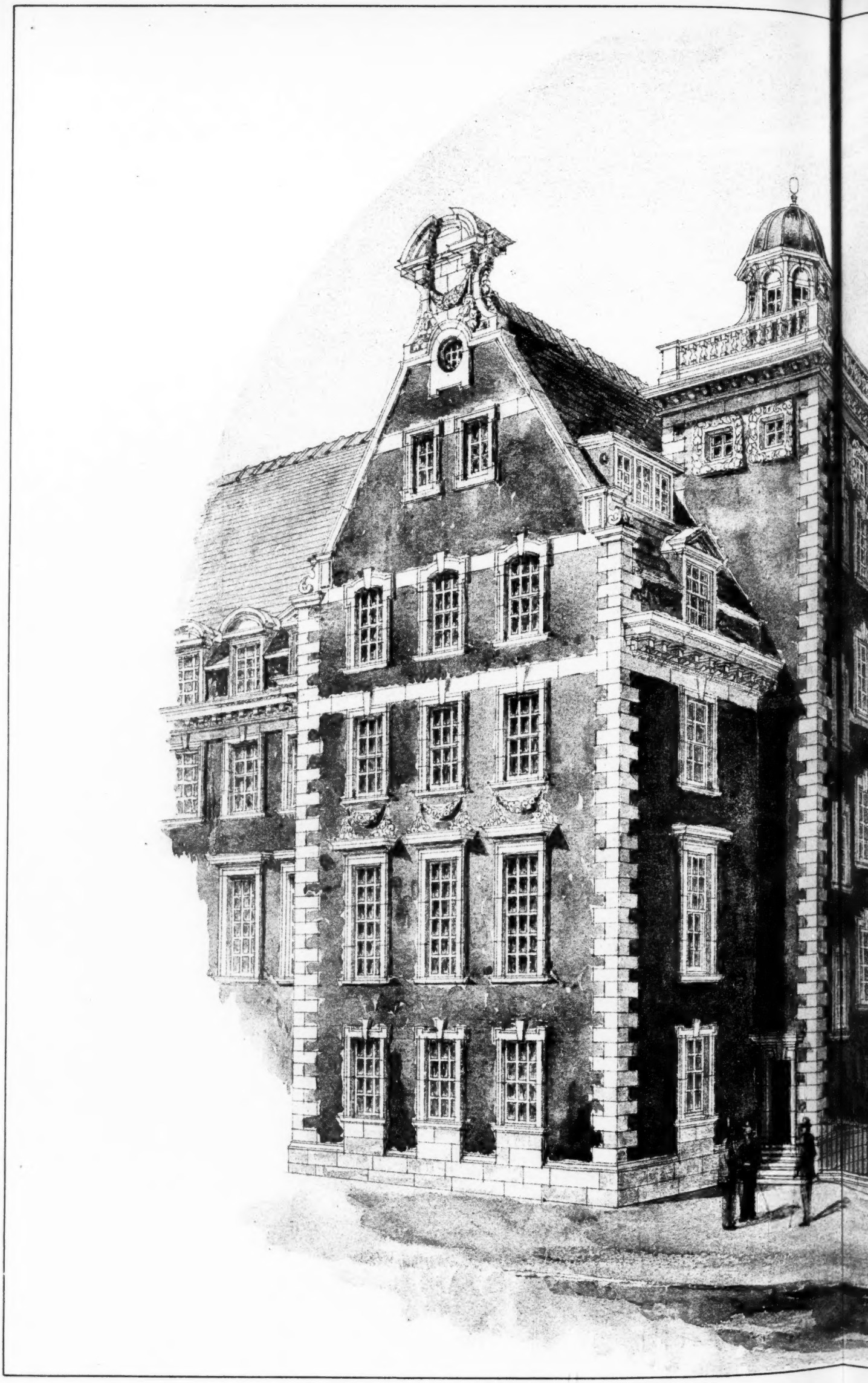

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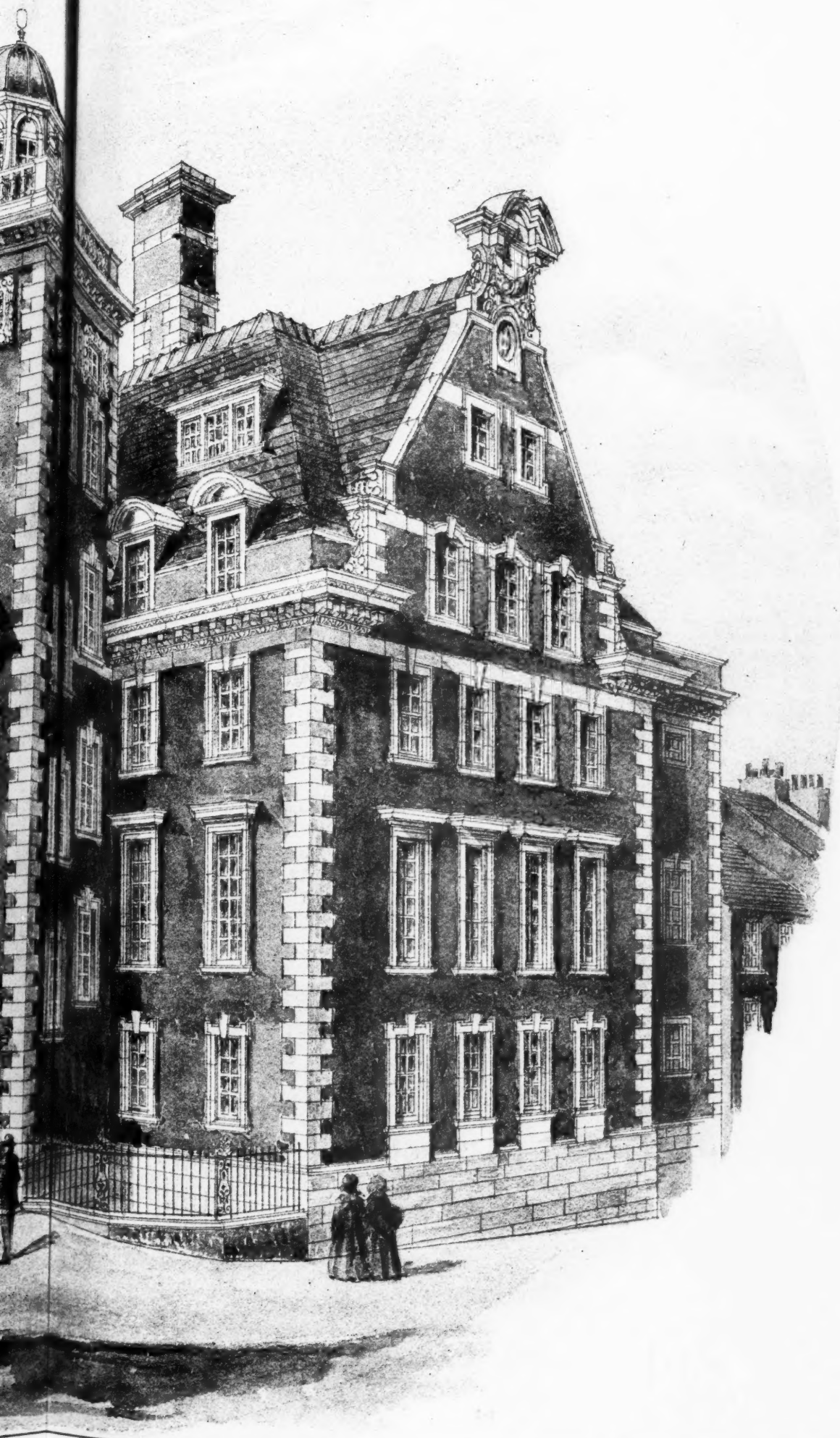

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